Risk Management Plan (RMP) & Process Safety Management (PSM) Manual

Newington Energy, LLC

Newington Energy
200 Shattuck Way
Newington, NH 03801

December 2007

Ref. No. 102692 PSM/RMP

Prepared for:

General Electric Contractual Services
Newington Energy
200 Shattuck Way
Newington, NH 03801

Prepared by:

TRITON ENVIRONMENTAL, INC.
Environmental Consulting & Engineering

385 Church Street, Suite 201, Guilford, Connecticut 06437 • Phone 203.458.7200 Fax: 203.458.7201

Newington Energy - EMERGENCY PHONE #'s (Yellow Pages)

Response Team Contact List

ICP Role	Name/Title	Response Time	Training [1] (Hours/Hazwoper)	Work Phone	Home Phone	Cell
Communications Coordinator	Power Plant Operator	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x123	NA	NA
Incident Commander (1st)	D. Argyros - EH&S Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x109	603-642-9992	603-531-9779
Incident Commander (2nd)	T. Fallon - Facility Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x102	207-384-4857	603-767-3575
Incident Commander (3rd)	C. Harrison - Operation Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880, x116	207-571-8430	207-229-5435
Incident Commander (4th)	M. Uhlar - Maintenance Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x115	603-343-4257	603-320-4250
Emergency Coordinator (1st)	D. Argyros - EH&S Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x109	603-642-9992	603-531-9779
Emergency Coordinator (2nd)	T. Fallon - Facility Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x102	207-384-4857	603-767-3575
Qualified Individual	T. Fallon - Facility Mgr.	60 minutes	24 Hrs/ Hazwoper	603-766-1880 x102	207-384-4857	603-767-3575

[1] - Some operations staff have received 40 Hr Hazwoper training. All operations staff has received at least 24 Hr Hazwoper training. Most staff has previous power plant experience and training.

Chain of Command Responsibilities

TEAM MEMBER	TEAM RESPONSIBILITY	RESPONSE TIME (Minutes)	CONTACT INFORMATION	
			WORK	HOME
D. Argyros, T. Fallon, C. Harrison	Coordinator/ Command	60 minutes	603-766-1880, ext. 109, 102, 116	603-642-9992, 207-384-4857, 207-571-8430
D. Argyros, T. Fallon, C. Harrison	Operations	60 minutes	603-766-1880, ext. 109, 102, 116	603-531-9779, 207-384-4857, 207-571-8430
D. Argyros, T. Fallon, C. Harrison	Planning	60 minutes	603-766-1880, ext. 109, 102, 116	603-531-9779, 207-384-4857, 207-571-8430
D. Argyros, T. Fallon, C. Harrison	Logistics	60 minutes	603-766-1880, ext. 109, 102, 116	603-531-9779, 207-384-4857, 207-571-8430
T. Fallon - Facility Mgr.	Finance	60 minutes	603-766-1880, ext. 102	207-384-4857

Emergency Response Contractors/Co-Op

Contractor/Co-Op	Phone	Response Time	Contract Responsibility
United Oil	888-276-0885	1 Hour or less	OSRO (Primary)
Clean Harbors	603-224-6626	1 Hour or less	OSRO (large spill to water)
Piscataqua Co-Op	603-430-7208	1 Hour or less	OSRO
Portsmouth Harbor Towing	603-436-0915	1 Hour or less	Waterside Response

Other Phone Numbers and Contacts

GECS Off-Site Resources		
ICP Role	**Name/Title**	**Telephone #'s**
O&M Region Manager	M. Childs	781-393-5211 (Work)
NE Region EH&S Mgr.	R. Frizzle	603-767-2515 (Work)
GECS EH&S Mgr.	K. Chang	678-844-4645
Legal Counsel	E. Falso	770-859-7383
GEPS Air Program Lead	D. Schultz	518-385-9792
GEPS Water Program Lead	D. Schultz	518-385-9792
GEPS Waste Program Lead	D. Gaspari	714-572-8732

Fire Departments		
ICP Role	**Name/Title**	**Telephone #'s**
Ambulance/Fire	Newington, NH - EMS	9-1-1 603-436-9441
Ambulance/Fire	Portsmouth, NH - EMS	9-1-1 603-427-1500
Ambulance/Fire	Kittery, ME - EMS	9-1-1 207-439-2262
Ambulance/Fire	New Castle, NH	9-1-1 603-436-2515
Ambulance/Fire	Durham, NH	9-1-1 603-868-5531
NH Fire Marshall	Concord, NH	603-271-3294

Security		
ICP Role	**Name/Title**	**Telephone #'s**
Police	Newington, NH	9-1-1 603-436-7033
Police	Portsmouth, NH	9-1-1 603-436-2145
State Police - NH	New Hampshire State Police	9-1-1 603-679-5663
State Police - ME	Maine State Police	9-1-1 207-439-1141
FBI	Boston, MA (Sabotage & Terrorism)	617-742-5533
FBI	Portsmouth, NH	603-431-4583
FBI	Portsmouth, NH – Senior Resident Agent	603-472-2224
US Marshall's Service	NH Branch	603-225-1632

Hospitals		
ICP Role	**Name/Title**	**Telephone #'s**
Hospital (1st) Portsmouth, NH	Portsmouth Regional Hospital	603-436-5110
Hospital (2nd)Dover, NH	Wentworth Douglass	603-742-5252
Hospital (3rd)Exeter, NH	Exeter Hospital	603-778-7311

Nearby Industries & Residences		
ICP Role	**Name/Title**	**Telephone #'s**
North of Site - Industry	Sea 3 - LPG Dist.	603-431-5990
North of Site - Industry	Sprague Energy - Fuel/Oils	603-431-6000
North of Site - Rail Road Track	Guilford Ind. - RxR	978-663-9310
West of Site - Industry	Georgia Pacific - Mfg.	603-433-8000
West of Site - Industry	Westinghouse - Mfg.	603-433-1000
South of Site - Commercial	NoEast Surgical Center	603-431-5593
South of Site - Commercial	Mareld Assoc. - Mixed use	Vacant
South of Site - Commercial	Hauch Storage - Warehouse	603-431-2749
East of Site - Residence	Yeaton Residence	603-436-4642
East of Site - Residence	Beebe Residence	603-431-5868
East of Site - Residence	Labrie Residence	

Marine Emergencies		
ICP Role	**Name/Title**	**Telephone #'s**
US Coast Guard	Portsmouth Harbor Station	603-436-4414
US Coast Guard	Marine Safety - New Castle, NH	603-433-7324
US Coast Guard	Marine Safety - Portland, ME	207-780-3251
US Coast Guard	To Report Spills	800-321-6742
Portsmouth Port Authority	Harbor Master	603-424-8802

Federal #'s		
ICP Role	**Name/Title**	**Telephone #'s**
OSHA	To report serious injuries	800-321-6742
EPA Region 1	To Report Spills	888-372-7341
National Response Ctr.	Spill to River	800-424-8802
ChemTrec	Chemical Information	800-424-9300

State of NH #'s		
ICP Role	**Name/Title**	**Telephone #'s**
NH Dept of Env. Services	Hazardous Materials Spills	603-271-3899
NH Dept of Env. Services	Temporary Hazardous Waste ID #	603-271-2921
NH Dept of Env. Services	Oil Spill Response	603-271-3644
NH Dept of Env. Services	Off-Hours - State Police	800-346-4009
NH Dept of Env. Services	Spills to Water Supply	603-271-0655
NH Dept of Env. Services	Waste Water Spills (Sewer)	603-271-2001
NH Dept of Env. Services	Air Resources - Air Emissions	603-271-1370
SERC	To Report Spills	603-439-9441

Sensitive Area Trustees #'s		
ICP Role	**Name/Title**	**Telephone #'s**
Trustee	Audubon Society of New Hampshire	603- 224-9909
Trustee	Ducks Unlimited	800-453-8257

Town of Newington #'s		
ICP Role	**Name/Title**	**Telephone #'s**
Newington Water Treatment	Spills to Sanitary Sewer System	603-431-4111
Newington Water Supply	Spills to Water Supply	603-427-1530 (day) 603-427-1552 (evening)
Newington DPW	Town Garage - Snow Plow	603-436-6829
LEPC	To Report Spills	603-436-5737

Other #'s		
ICP Role	**Name/Title**	**Telephone #'s**
Local TV/Radio for Evacuation		911
Weather Report Phone Number		603-742-2511

TABLE OF CONTENTS

FIGURES

DRAWINGS

APPENDICES

1.0 - INTRODUCTION

This Risk Management Plan (RMP)/ Process Safety Management (PSM) Manual has been prepared for Newington Energy, LLC's (Newington Energy) Newington, New Hampshire facility. This Plan has been developed in accordance with the EPA regulations 40 CFR 68, “Chemical Accident Prevention Provisions” and OSHA regulations 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals". The purpose of this RMP/PSM Manual is to assist with the prevention of accidental releases of toxic and flammable substances that can cause harm to the public, facility employees, and to the environment.

This RMP/PSM Manual has been developed by Triton Environmental, Inc. on behalf of Newington Energy specifically to prevent/mitigate accidental releases associated with the storage and use of anhydrous ammonia at the Newington Energy facility. As noted in specific sections, portions of this Plan, including technical details associated with anhydrous ammonia operations were prepared by LGA Engineering, of Hanover, Massachusetts. This manual was developed to meet the requirements of the RMP/PSM regulations and is available to government agencies and the public for review.

1.1 - Operations

Newington Energy, L.L.C. operates the Newington Power Facility on an approximately 24-acre industrially zoned parcel in Newington, New Hampshire (see Figure 1). The site is situated approximately 2.5-miles northwest of Portsmouth, 7-miles southeast of Dover and is approximately 1,000-feet southwest of the Piscataqua River. The natural gas fired facility can nominally generate 525 MW of electricity using advanced “combined cycle technology.” To enhance overall reliability, the combustion turbines are also capable of firing low sulfur No 2 fuel oil (distillate) as a back up fuel. The major components of the plant include two combustion turbine generators, two heat recovery steam generators, a steam turbine generator with condenser, a cooling system consisting of mechanical draft cooling towers equipped with plume abatement, a water treatment facility, and a selective catalytic reduction (SCR) system (see Figure 2).

Nitrogen oxide emissions will be controlled by the SCR system using anhydrous ammonia as the reagent. The ammonia storage facilities at the plant consist of two 2,000-

gallon storage tanks located in a common concrete impoundment basin. Vapor and liquid connections are provided for receiving bulk ammonia deliveries by tank truck. When the power plant is operating, a continuous stream of ammonia vapor is withdrawn from the vapor space of each tank for use in the SCR process. A more detailed description of the SCR system has been provided in Appendix A.

1.2 - Applicability

Anhydrous ammonia will be stored as a pressurized liquid in two adjacent 2,000-gallon tanks. The presence of approximately 17,000 pounds (i.e., greater than 10,000 pounds) of anhydrous ammonia requires compliance with EPA's RMP rules (Risk Management Program, 40 CFR 68) and OSHA's PSM rules (Process Safety Management, 29 CFR 1910.119).

The facility is subject to Program 3 requirements as specified in 40 CFR 68.10 based on the determination that the toxic endpoint for a worst-case release of anhydrous ammonia is within the vicinity of public receptors. The facility has completed and submitted the RMP Submit to EPA. A copy of that submittal has been included in Appendix B.

2.0 - PROCESS SAFETY INFORMATION

Newington Energy maintains current safety information regarding their anhydrous ammonia SCR process and off-loading in accordance with 40 CFR 68.65. Safety information is presented in the following sections.

2.1 - Hazards of Regulated Substance

The following information has been compiled and provided in Appendix C of this manual to identify the hazards of anhydrous ammonia:

- MSDS (Anhydrous Ammonia)
- Compressed Gas Assoc. Table 6-1 Physical Properties
- Compressed Gas Assoc. Table 6-2 Properties Liquid Ammonia
- Compressed Gas Assoc. Table 9-1 Toxicity

The information provided in Appendix C includes the following information:

- Toxicity information;
- Permissible exposure limits;
- Physical data;
- Reactivity data;
- Corrosivity data;
- Thermal and chemical stability data; and
- Hazardous effects of inadvertent mixing of different materials that could foreseeably occur.

2.2 - Safety Information - Technology of the Process

2.2.1 - Block Flow Diagram

A simplified Process Block Flow Diagram has been included as Drawing 1 that identifies the SCR system and its location in the process relative to the combustion turbines and the exhaust.

2.2.2 - Process Chemistry

The pressure in the storage tanks is maintained by vaporizing liquid ammonia in electrically heated vaporizers mounted below the tanks which return vaporized ammonia to each tank's vapor space. The SCR feed flows from each tank separately to the injection skid for each HRSG where it is mixed with a low-pressure air stream to provide increased sufficient flowing volume to facilitate good mixing. The air/ammonia mixture is divided into multiple streams and injected into and mixed with the combustion turbine exhaust gases upstream of the SCR catalyst bed.

2.2.3 - Maximum Intended Inventory

The maximum intended inventory of anhydrous ammonia is 16,900 lbs., based on the following:

- 2 – 2,000 gallon tanks;
- maximum fill setting is set for 82% therefore contents of each tank is limited by administrative controls to 1,640 gallons of liquid; and
- At 5.15 lb./gal for anhydrous ammonia at 60°F. the maximum liquid contents of each tank is 8,450 pounds.

2.2.4 - Safe Upper and Lower Limits

The following information was provided to Newington Energy for the safe upper and lower limits for the system:

- The tank
  - 265 psig @ 170f
  - 2000 gal gross
- Vaporizer
  - 325psig @ 150f
  - 40kW
  - Op pressure 100 psig
  - Temp 64 F
  - Design pressure 325psig
  - design temp 150 f
  - min design temp -10 f
  - High Temp control 200 f
  - High pressure Control 52 psig
  - Low flow control 10 lb/hr
- Dilution Blowers

  - 5332 lb/hr
  - 40 hp motor
- Dilution Air Heaters
  - Op Pressure 52psig
  - Op Temp 300F
  - Output 120kW
  - Outlet air temp 225F
  - low flow control 3500lb/hr
  - low/low 3000lb/hr
- Air Mixer
  - 144lb/hr to 4740lb/hr operating

2.2.5 - Consequences of Deviation

Consequences of deviation could potentially result in releases to the environment or exposure of anhydrous ammonia to employees or to the public as detailed in Section 4.0, Hazard Assessment, of this manual.

2.3 - Safety Information - Equipment in the Process

2.3.1 - Materials of Construction

The following materials were used in the construction of the SCR system:

- Tank shell SA-516-70
- Pipe SA-106-8 sch 40
- Bolts SA-193-B7
- Nuts SA-194-2H
- Gaskets Garlock Nylon

2.3.2 - Piping and Instrumentation Diagrams

Process and Instrumentation Diagrams (P&ID) have been included in this manual as Drawing 2 – P&ID Anhydrous Ammonia Storage & Distribution and Drawing 3 – P&ID SCR Ammonia/Air Injection.

2.3.3 - Electrical Classification

The SCR system's electrical classification is Class 1, Division 1.

2.3.4 - Relief System Design & Design Basis

Relief valves, located on the top of the ammonia storage tanks, were designed in accordance with:

- American National Standard Institute (ANSI) K61.1 - Safety Requirements for the Storage and Handling of Anhydrous Ammonia (1999 Edition); and

- OSHA 29 CFR 1910.111 Storage and Handling of Anhydrous Ammonia.

2.3.5 - Ventilation System Design

A ventilation system has not been designed for the SCR system since it is not located in an enclosed area.

2.3.6 - Design Codes and Standards Employed

The following design codes and standards were employed in the construction of the SCR system:

- American National Standard Institute (ANSI) K61.1 - Safety Requirements for the Storage and Handling of Anhydrous Ammonia (1999 Edition); and

- OSHA 29 CFR 1910.111 Storage and Handling of Anhydrous Ammonia.

2.3.7 - Material and Energy Balances

The quantity of anhydrous ammonia needed in the SCR system will be dependent on the fuel powering the gas turbines. Approximately 2,800 lb./day of anhydrous ammonia would be required while operating on natural gas. Approximately 8,450 lb./day of anhydrous ammonia would be required while operating on No. 2 fuel oil.

2.3.8 - Safety Systems

A water deluge system has been designed and installed over the ammonia tanks by GE's fire protection engineering consultant. The system was inspected and approved by the fire marshal on June 26, 2002.

3.0 - PROCESS HAZARD ANALYSIS

As required every five years, a PHA was completed on May 8, 2007 with a review team of personnel from Triton Environmental, Inc. and Newington Energy. The initial Process Hazard Analysis (PHA) was completed five years prior by LGA Engineering and Newington Energy personnel on May 2, 2002. The report included in Appendix D was prepared by Triton Environmental, Inc. and summarizes the findings and recommendations that were developed during the most recent PHA completed in 2007.

4.0 - HAZARD ASSESSMENT

Newington Energy is subject to Program 3 requirements as described above and has therefore been required to complete the hazard assessment provided below.

4.1 - Off-site Consequence Analysis

This section of the RMP/PSM Manual presents Newington Energy's off-site consequence analysis. An off-site consequence analysis was completed in order to provide information to the public and to government agencies about the potential consequences of an accidental release of anhydrous ammonia at Newington Energy's facility. The off-site consequence analysis was completed by LGA Engineering and consists of two (2) components including: (1) Worst Case Release Scenario and (2) Alternative Release Scenario.

4.2 - Worst-Case Release Scenario

Each storage tank holds 2,000 gallons of liquid when completely full. The maximum fill setting is set for 82%, so the contents of each tank is limited by administrative controls to 1,640 gallons of liquid. At 5.15 lb./gal for anhydrous ammonia at 60°F. the maximum liquid contents of each tank is 8,450 pounds.

A worst case design release was completed for Newington Energy for 16,900 lb. of pressurized liquid ammonia. According to the EPA calculation software, RMP*Calc, the endpoint distance for this release is 1.5 miles, as documented below:

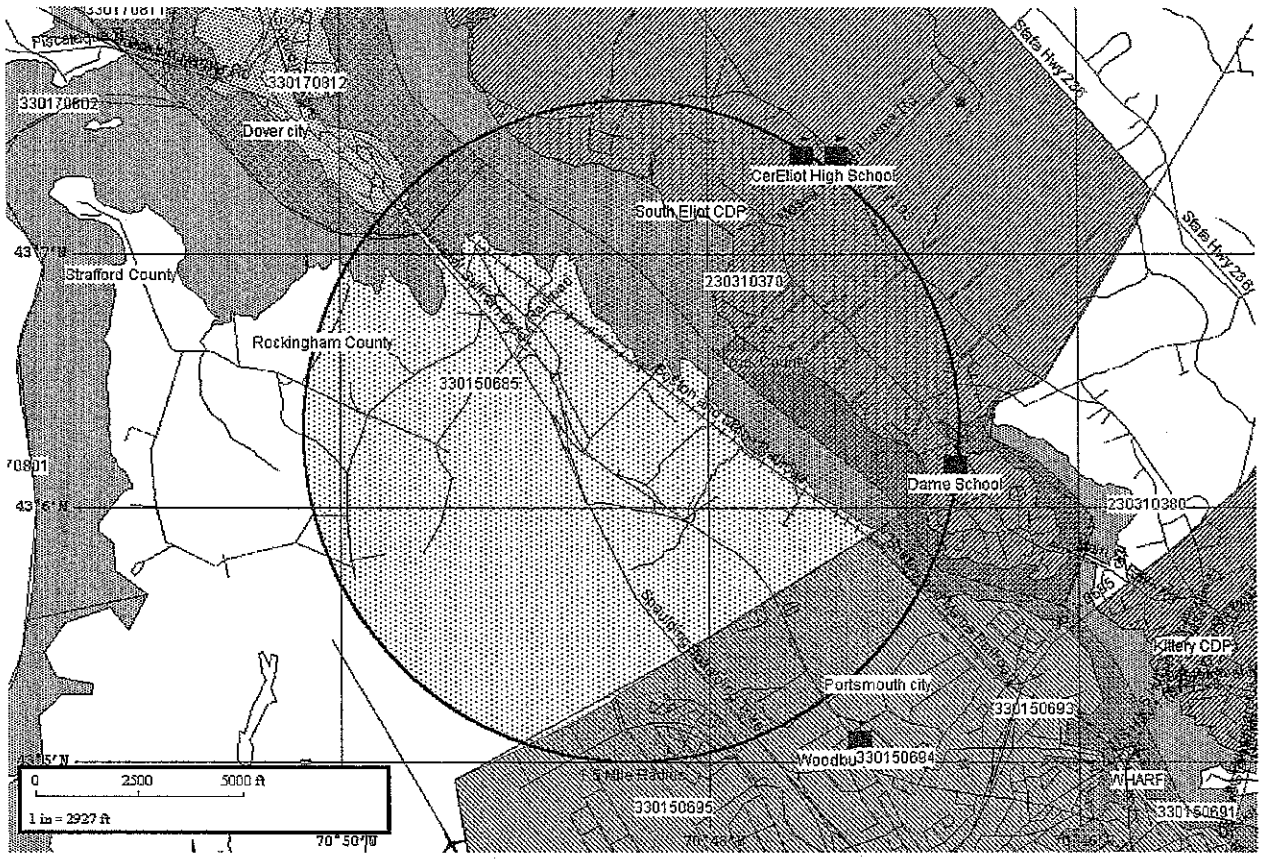
RMP*Comp Ver. 1.07 — Results of Consequence Analysis

Chemical: Ammonia (anhydrous) — CAS #: 7664-41-7
Category: Toxic Gas — Scenario: Worst-case
Liquefied under pressure — Quantity Released: 16900 pounds
Release Duration: 10 min — Release Rate: 1690 pounds per min
Mitigation Measures: NONE
Topography: Urban surroundings (many obstacles in the immediate area)
Toxic Endpoint: 0.14 mg/L; basis: ERPG-2
Estimated Distance to Toxic Endpoint: 1.5 miles (2.4 kilometers)

--------Assumptions About This Scenario---------
Wind Speed: 1.5 meters/second (3.4 miles/hour)
Stability Class: F

Stability Class: F
Air Temperature: 77 degrees F (25 degrees C)

The 1.5 mile radius from the site of the spill will reach the residential neighborhood across the Piscataqua in Eliot, Maine, some residential parts of Portsmouth near Gosling Road, and over the bridge to the nearest part of Dover Point. The following image illustrates the circle with a 1.5 mile radius:



Part of the RMP submission is an estimate of the permanent residential population in the zone covered by the Worst Case Scenario. LandView software was used to estimate population by the Block Group Centroid method. The approach ignores all population in an area ("block group") if the centroid of that area does not fall within the circle being considered. The instructions state that this method provides a reasonable approximation of the population in densely settled areas for radii greater than 1 mile. Part of this description applies to the circle under consideration. The resulting population estimate is 2,400.

4.3 - Alternate Release Scenario Analysis

The Alternate Release Scenario is a potential incident that would be more likely than the worst case. The scenario must have offsite consequences and should be representative of a realistic situation. A truck unloading hose coupling failure was selected as the alternative release scenario for the Newington Energy facility.

The alternate scenario assumes that a coupling failure occurs during a truck unloading, releasing anhydrous ammonia through a crack 2" long by 1/16" wide. The flow of 300 pounds per minute would continue for one minute until the operator shuts the truck valve. The hose pressure decays as the hose empties, releasing an additional 30 pounds over the next minute for an incident total of 330 pounds. The EPA software provides the following results:

RMP*Comp Ver. 1.07 Results of Consequence Analysis

Chemical: Ammonia (anhydrous) CAS #: 7664-41-7
Category: Toxic Gas Scenario: Alternative
Liquefied under pressure Release Duration: 1 minutes
Release Rate: 300 pounds per min Mitigation Measures: NONE
Topography: Urban surroundings (many obstacles in the immediate area)
Toxic Endpoint: 0.14 mg/L; basis: ERPG-2
Estimated Distance to Toxic Endpoint: 0.1 miles (0.2 kilometers)

--------Assumptions About This Scenario---------
Wind Speed: 3 meters/second (6.7 miles/hour)
Stability Class: D
Air Temperature: 77 degrees F (25 degrees C)

The resulting distance, 0.1 miles, covers land a short distance offsite. It is in the industrial land to the north, and includes no permanent residential population.

5.0 - OPERATING PROCEDURES

Operating procedures are provided in Appendix E and will be readily accessible to employees who operate or maintain the SCR system. The following procedures have been developed:

- Operating Procedure 4.09 - Anhydrous Ammonia System/SCR;
- Off-loading (Hazardous Chemical Delivery) Procedure (Rev. 11);
- Emergency Response Procedure ERP-09; and
- Lockout/Tagout (LOTO) Procedures.

The operating procedures will be reviewed by Newington Energy as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment, and changes to stationary sources. Newington Energy will certify annually that these operating procedures are current and accurate (Appendix F).

Newington Energy has developed and implemented safe work practices to provide for the control of hazards during operations such as lockout/tagout; confined space entry; opening process equipment or piping; and control over entrance into a stationary source by maintenance, contractor, laboratory, or other support personnel. These safe work practices are applied to employees and contractor employees.

6.0 - TRAINING

6.1 - Initial Training

Training for employees that are involved with operating the SCR system will be completed as outlined in Appendix G. The training will be completed by GECS personnel. In addition, the training will include a review of the operating procedures provided in Appendix E. The training shall include an emphasis on specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks. Additional training will be provided to Newington Energy personnel by the SCR vendor.

For employees responsible for maintaining the SCR system, training will include operating procedures associated with maintenance of the equipment mechanical integrity.

6.2 - Intermittent Training - Change of Process or Materials

Training will be required for employees involved with operating the SCR system when it is determined that a process, procedure, or material has changed that would affect the operation of equipment or storage of anhydrous ammonia (Section 8.0).

6.3 - Refresher Training

Refresher training shall be provided at least every three (3) years, and more often if necessary, to each employee involved in operating the SCR system to assure that employees understand and adhere to the operating procedures provided in Appendix E. The content of the refresher training will be similar to the information provided during initial training.

6.4 - Training Documentation

Newington Energy shall document that each employee involved in operating or maintaining the SCR system has received and understood the training described above. Employee training records are maintained in the facility’s Training Tracker electronic training database.

7.0 - MECHANICAL INTEGRITY

Newington Energy maintains the on-going integrity of the SCR by completing maintenance activities as specified in documents provided by the manufacturer of the components of the SCR system. Specifically, the following manufacturer's maintenance programs are used on specific components of the SCR system:

- Wahlco (manufacturer)
  - NH3 Tanks
- Foster Wheeler (manufacturer)
  - Hoffman Blowers
  - Chromalox
  - Foster Wheeler Injection Grid

The activities include inspection and testing of pressure vessels, emergency shutdown, controls, pumps, and other equipment associated with operating the SCR system.

Inspection and testing procedures have been developed by Newington Energy that follow recognized and generally accepted good engineering practices. The frequency of inspections and tests of process equipment will be consistent with applicable manufacturers' recommendations, industry standards or codes, good engineering practices and prior operating experience.

Employees responsible for the on-going integrity of process equipment on the SCR system will be trained in an overview of the process. Training will include a review of the hazards associated with anhydrous ammonia as well as operating procedures associated with maintaining the equipment integrity.

Newington Energy has developed a checklist to document each inspection and test that is required to be completed on the SCR system. The checklist identifies the following information:

- date of the inspection or test;
- the name of the person who performed the inspection or test;
- the serial number or other identifier of the equipment on which the inspection or test was performed;

- a description of the inspection or test performed; and
- the results of the inspection or test.

When deficiencies are identified during inspections, Newington Energy will correct the problem to return the SCR system to acceptable parameter limits specified in the process safety information (Section 2.0). Corrections will occur before further use or in a safe and timely manner, when necessary means are taken to assure safe operation.

Newington Energy has constructed the SCR system and assured that the equipment, as it is fabricated, is suitable for the process application. Appropriate checks and inspections are performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions. Newington Energy assures that the maintenance materials, spare parts and equipment are suitable for the SCR system by completing the pre-startup safety review described in Section 9.0.

8.0 - MANAGEMENT OF CHANGE

Newington Energy has established and implemented written procedures to manage changes to the SCR system equipment and associated procedures. Those procedures have been included in Appendix E and assure that the following considerations are addressed prior to any change:

- The technical basis for the proposed change;
- Impact of change on safety and health;
- Modifications to operating procedures;
- Necessary time period for the change; and
- Authorization requirements for the proposed change.

The SCR system equipment and associated procedures will be reviewed semi-annually (twice per year) to ensure that documentation included in this manual reflects current personnel and actual operating conditions.

Newington Energy employees, as well as contract employees, involved in operating or performing maintenance on the SCR system will be informed of, and trained in, the change prior to start-up of the process or affected part of the process (Section 6.0).

If a change covered by this paragraph results in a change in the process safety information (Section 2.0), such information shall be updated accordingly. If a change described above results in a change in the operating procedures or practices required by 40 CFR 68.69 (Operating Procedures), such procedures or practices shall be updated accordingly.

9.0 - PRE-STARTUP REVIEW

A pre-startup safety review will be completed by Newington Energy on the SCR system prior to initial startup or when a modification is significant enough to require a change in the process safety information. The pre-start-up safety review will confirm the following information prior to the introduction of anhydrous ammonia to the SCR system:

- Construction and equipment is in accordance with design specifications;
- Safety, operating, maintenance, and emergency procedures are in place and are adequate;
- For new stationary sources, a process hazard analysis has been performed and recommendations have been resolved or implemented before startup; and modified stationary sources meet the requirements contained in management of change (Section 8.0); and
- Training of each employee involved in operating the process has been completed.

Operating procedures have been developed for initial startup and startup following an emergency shutdown (Section 5.0).

10.0 - COMPLIANCE AUDITS

In accordance with 40 CFR 68.79, Newington Energy will evaluate compliance with this Plan at least once every three (3) years to verify that the procedures and practices developed are adequate and being followed. The compliance audit has been developed to ensure that employees and contractors are implementing the risk management program properly. The audit will be conducted by a person knowledgeable with the covered process. The audit's findings will be reported on the checklist provided in Appendix F and written reports of the findings and corresponding corrective actions taken will be maintained for five (5) years.

11.0 - INCIDENT INVESTIGATION

Newington Energy will investigate each incident which resulted in, or could have reasonably resulted in, a catastrophic release, in accordance with 40 CFR 68.81. An incident investigation will be initiated as soon as possible, but not later than 24 hours after the incident occurred. Newington Energy will promptly address and resolve the investigation findings and recommendations, and resolutions and corrective actions will be documented and maintained for five (5) years.

An on-line EHS Incident Report is used by Newington Energy to document, address, and resolve the findings of the investigation. The report includes the following information:

- Date of incident;
- Date investigation began;
- A description of the incident;
- The factors that contributed to the incident; and,
- Any recommendations resulting from the investigation.

The EHS Incident Report also includes fields for documenting resolutions and corrective actions. Upon completion, the report will be reviewed with all affected personnel whose job tasks are relevant to the incident findings including contract employees, where applicable.

12.0 - EMPLOYEE PARTICIPATION

The Newington Energy facility has a limited number of employees staffed at the facility that will have direct involvement with the SCR system. Those employees will be involved with the continued development of the facility RMP/PSM program by participating in the following activities:

- Process Hazard Analysis Development and Review;
- Employee Training; and
- Compliance Audits.

Newington Energy will provide employees involved with the SCR system with access to process hazard analyses and to all other information required to be developed under the RMP/PSM requirements.

13.0 - HOT WORK PERMIT

Hot work permits can be generated by a member of GECS management or by a lead operator as required by GECS's Hot Work program.

14.0 - CONTRACTORS

GECS will obtain and evaluate information regarding the contract owner or operator's safety performance and programs when selecting a contractor. GECS will develop and implement safe work practices to control the entrance, presence, and exit of the contractor and contract employees in covered process areas.

In addition, GECS will periodically evaluate the performance of the contract owner or operator in fulfilling their obligations as specified in paragraph (c) of this section.

Contractor notification of hazards and training will be provided as part of the GECS contractor safety program. GECS will inform contractors of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process by way of the contractor safety program. Emergency Response activities related to anhydrous ammonia as specified in Section 15 will also be conveyed to contractors during the contractor safety program.

15.0 - EMERGENCY RESPONSE

Newington Energy has developed an emergency response program for the purpose of protecting public health and the environment from releases of hazardous materials. That program is provided in the Newington Energy, Integrated Contingency Plan (ICP) and has been developed in the format of the EPA One Plan. The ICP includes the following elements:

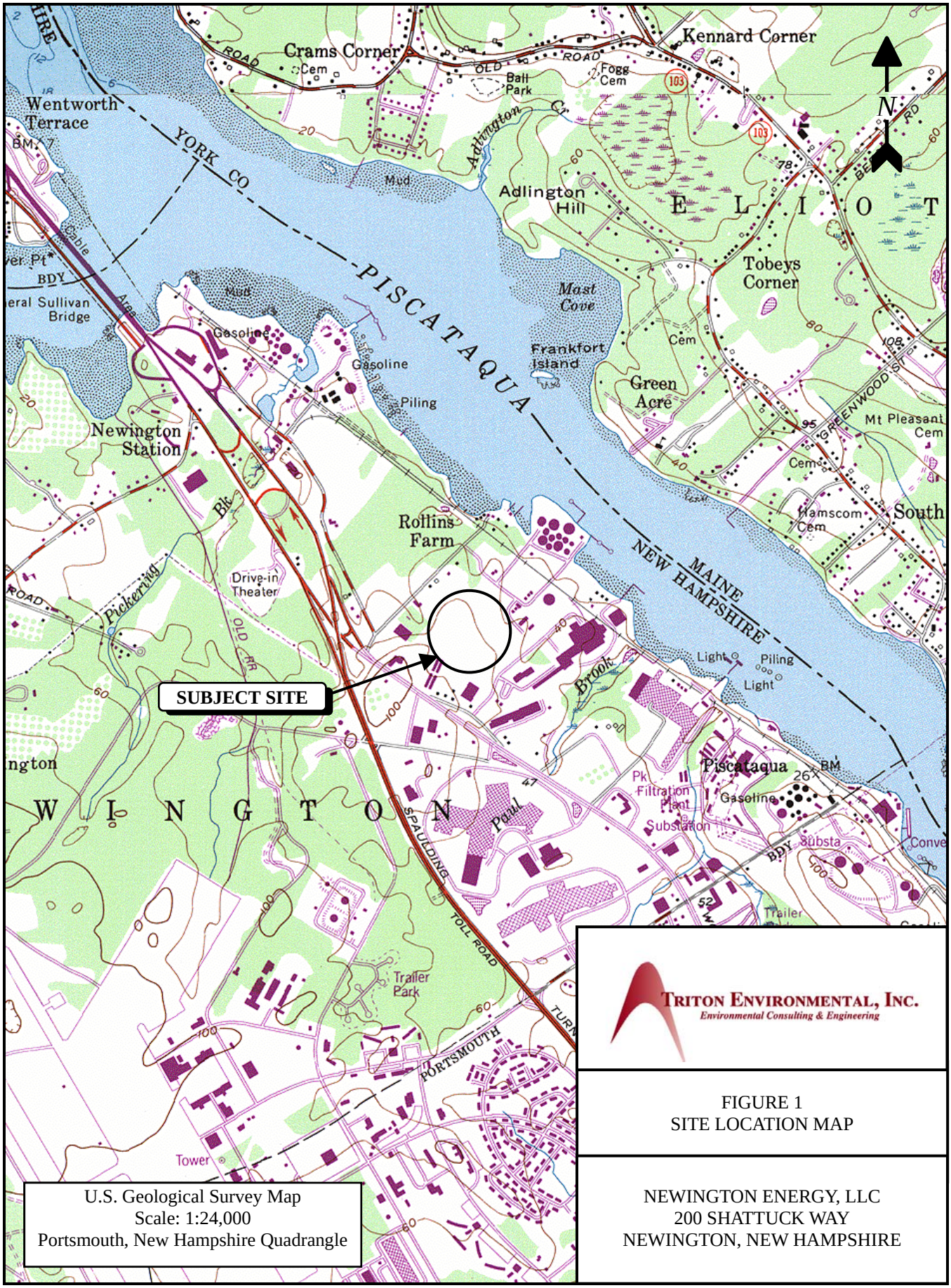
- An emergency response plan that contains:
  - Procedures for informing the public and local emergency response agencies about accidental releases;
  - Documentation of proper first-aid and emergency medical treatment necessary to treat accidental human exposures; and
  - Procedures and measures for emergency response after an accidental release of a regulated substance;
- Procedures for the use of emergency response equipment and for its inspection, testing, and maintenance (Appendix H - Personal Protective Equipment (PPE) and Appendix I - Emergency Response Equipment);
- Training for all employees in relevant procedures; and
- Procedures to review and update, as appropriate, the emergency response plan to reflect changes at the facility and ensure that employees are informed of changes.

In addition, a unique emergency response procedure (ERP-09, Anhydrous Ammonia Release Procedures) has been developed for response to releases from the SCR system and has been included in Appendix E. Evacuation procedures are detailed in the ICP and evacuation routes/muster areas have been identified in Figure 3.

The Local Emergency Planning Committee (LEPC) and other emergency response organizations will be provided with copies of this RMP/PSM Manual as well as the ICP referenced above in order to assist local organizations in developing and implementing the community emergency response plan.

Figure 1

Site Location Map



U.S. Geological Survey Map
Scale: 1:24,000
Portsmouth, New Hampshire Quadrangle

TRITON ENVIRONMENTAL, INC.
Environmental Consulting & Engineering

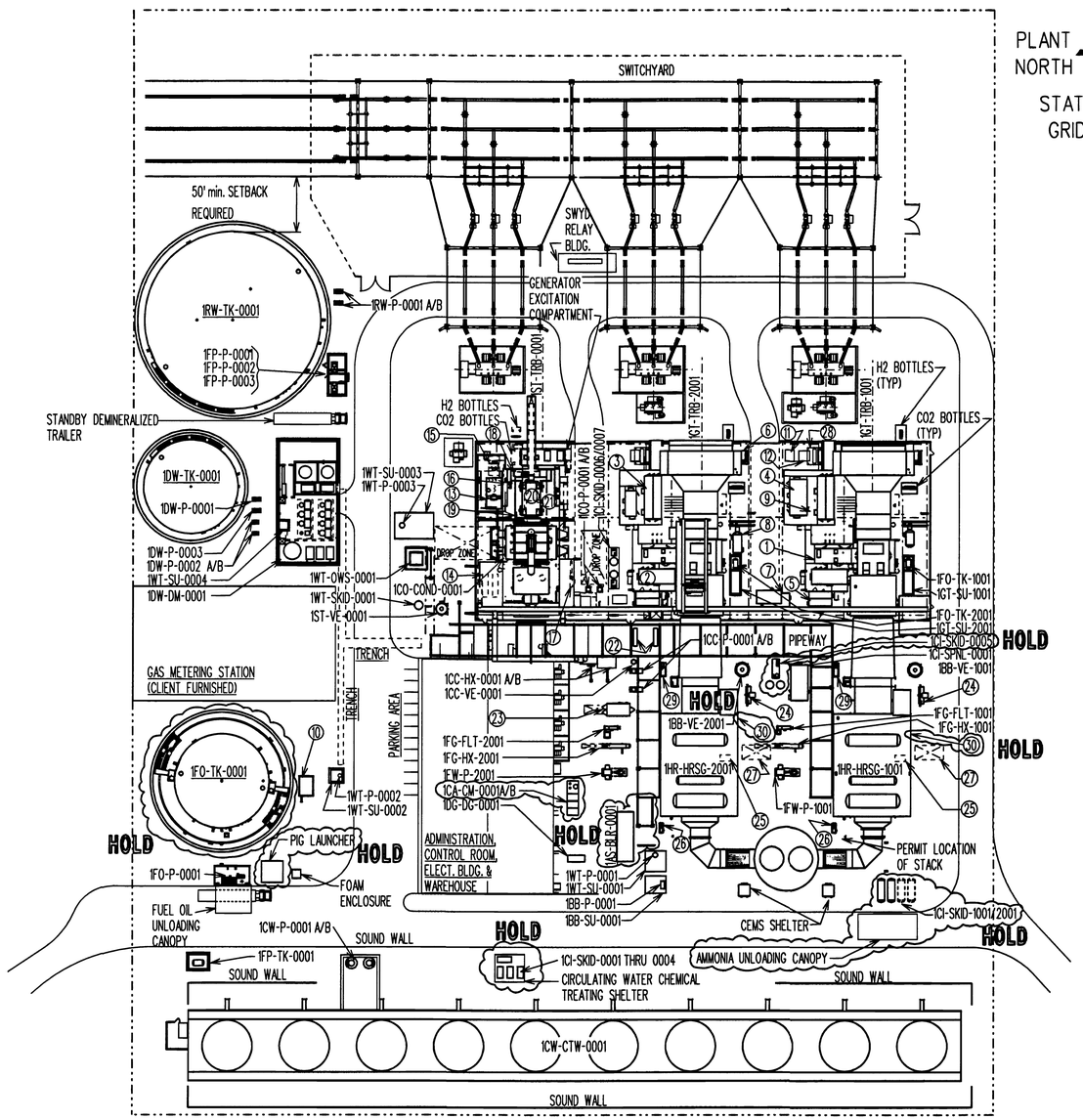
FIGURE 1
SITE LOCATION MAP

NEWINGTON ENERGY, LLC
200 SHATTUCK WAY
NEWINGTON, NEW HAMPSHIRE

R:\^PROJECTS\102000\102650-699\102692\Topo\102692topo.doc

Figure 2

Facility Plot Plan



EQUIPMENT LIST

1AS-BLR-0001	AUXILIARY BOILER	1FG-HX-1001	FUEL GAS HEATER
1BB-P-0001A/B	BLOWDOWN WATER SUMP PUMPS	1FG-HX-2001	FUEL GAS HEATER
1BB-SU-0001	BLOWDOWN SUMP	1FO-P-0001	FUEL OIL UNLOADING PUMP
1BB-VE-1001	ATMOSPHERIC BLOWDOWN DRUM	1FO-TK-0001	FUEL OIL STORAGE TANK
1BB-VE-2001	ATMOSPHERIC BLOWDOWN DRUM	1FO-TK-1001	CTG FALSE START DRAIN OIL TANK
1CA-CM-0001 A/B	PLANT/INSTRUMENT AIR COMPRESSOR SKID	1FO-TK-2001	CTG FALSE START DRAIN OIL TANK
1CC-HX-0001 A/B	CLOSED LOOP COOLING WATER EXCHANGERS	1FP-P-0001	FIRE WATER PUMP - ELECTRIC
1CC-P-0001 A/B	CLOSED LOOP COOLING WATER PUMPS	1FP-P-0002	FIRE WATER PUMP - DIESEL
1CC-VE-0001	CLOSED LOOP COOLING WATER BLADDER TANK	1FP-P-0003	FIRE WATER JOCKEY PUMP
1CI-SKID-0001	SULFURIC ACID SKID	1FP-TK-0001	FOAM TANK
1CI-SKID-0002	BIOCIDE SKID	1FW-P-1001	HP/IP FEEDWATER PUMPS
1CI-SKID-0003	CORROSION INHIBITOR SKID	1FW-P-2001	HP/IP FEEDWATER PUMPS
1CI-SKID-0004	SCALE INHIBITOR SKID	1GT-SU-1001	CTG WASH WATER DRAIN SUMP
1CI-SKID-0005	HP / IP PHOSPHATE SKID	1GT-SU-2001	CTG WASH WATER DRAIN SUMP
1CI-SKID-0006	AMINE SKID	1GT-TRB-1001	GAS TURBINE GENERATOR
1CI-SKID-0007	OXYGEN SCAVERGER SKID	1GT-TRB-2001	GAS TURBINE GENERATOR
1CI-SKID-1001/2001	ANHYDROUS AMMONIA STORAGE AND VAPORIZATION SKIDS	1HR-BLR-1001A/B	COOLING AIR BLOWER SKID
1CI-SPNL-0001	WATER / STEAM SAMPLING	1HR-BLR-2001A/B	COOLING AIR BLOWER SKID
1CO-COND-0001	SURFACE CONDENSER	1HR-HRSG-1001	HEAT RECOVERY STEAM GENERATOR
1CO-P-0001 A/B	CONDENSATE PUMPS	1HR-HRSG-2001	HEAT RECOVERY STEAM GENERATOR
1CW-CTW-0001	COOLING TOWER	1RW-P-0001 A/B	RAW WATER PUMPS
1CW-P-0001 A/B	MAIN CIRCULATING WATER PUMPS	1RW-TK-0001	RAW WATER STORAGE TANK
1DG-DG-0001	EMERGENCY GENERATOR	1ST-TRB-0001	STEAM TURBINE GENERATOR
1DW-DM-0001	DEMINERALIZED WATER TREATMENT SYSTEM	1ST-VE-0001	ATMOSPHERIC DRAIN TANK
1DW-P-0001	DEMINERALIZED WATER TRANSFER PUMP	1WT-OWS-0001	OIL/WATER SEPARATOR
1DW-P-0002 A/B	DEMINERALIZED WATER PUMPS	1WT-P-0001	OILY WATER SUMP PUMP
1DW-P-0003	DEMINERALIZED WATER TRANSFER PUMP	1WT-P-0002	OILY WATER SUMP PUMP
1DW-TK-0001	DEMINERALIZED WATER STORAGE TANK	1WT-P-0003	CLEAN WATER SUMP PUMP
1FG-FLT-1001	FUEL GAS FILTER SEPARATOR	1WT-P-0004	DEMINERALIZED WATER PUMP
1FG-FLT-2001	FUEL GAS FILTER SEPARATOR	1WT-SKID-0001	SANITARY LIFT STATION
		1WT-SU-0001	OILY WATER SUMP - GTG/STG
		1WT-SU-0002	OILY WATER SUMP - FUEL OIL
		1WT-SU-0003	CLEAN WATER SUMP
		1WT-SU-0004	DEMINERALIZED AREA SUMP

GE 7FA EQUIPMENT/SKIDS

1. ACCESSORY MODULE
2. LIQUID FUEL/ATOMIZING AIR MODULE
3. PACKAGED ELECTRIC ELECTRONIC CONTROL CENTER
4. LCI/EX COMPARTMENT
5. WATER INJECTION SKID
6. AIR PROCESSING SKID
7. WATER WASH SKID
8. CO2 FIRE PROTECTION SKID
9. LCI/HEAT EXCHANGER
10. FUEL FORWARDING SKID-PUMPS
11. EXCITATION PPT TRANSFORMER
12. DC LINK REACTOR
22. FUEL FORWARDING SKID-METERING
23. FUEL FORWARDING SKID-HEATERS

STG COMPONENTS

13. LUBE OIL CONSOLE
14. CONDENSATE VACUUM
15. HYDRAULIC POWER UNIT
16. SEAL OIL SKID
17. GLAND CONDENSER
18. LIQUID LEVEL DETECTOR
19. FLOAT TRAP
20. H2 / CO2 MANIFOLD
21. HYDROGEN CABINET

HRSG COMPONENTS

24. BURNER MANAGEMENT SKID
25. DUCT BURNER COOLING AIR FANS:
    - 1HR-BLR-1001 A / B
    - 1HR-BLR-2001 A / B
26. RECIRCULATION PUMPS:
    - 1HR-P-1001
    - 1HR-P-2001
27. SCREEN BASKET DROP AREA
30. AMMONIA SKID

HOLD

MISCELLANEOUS

28. GEN MAIN BREAKER
29. HEAT TRACING PANEL & XFMR

0′ 50′ 100′ 200′ 300′ 400′

REDUCED PRINT SCALE

REV.	DATE	REVISION DESCRIPTION	DRWN CHK.	LAYO MECH	CIVIL ELEC	ENGM PROJ
1	8/01/00	ISSUED APPROVED FOR DESIGN	S.L. J.O.	J.A. —	— —	R.D. W.A.
2	12/26/00	APPROVED FOR CONSTRUCTION	S.L. J.O.	J.A. —	— —	RGT for R.D. W.A.

REV.	DATE	REVISION DESCRIPTION	DRWN CHK.	LAYO MECH	CIVIL ELEC	ENGM PROJ

DWG.NO.

REFERENCE DRAWINGS

DUKE/FLUOR DANIEL

		INITIALS/DATE
DRAWN BY	M.LOWRY	12/27/00
CHECKED BY	J.OUTHIER	12/27/00
LAYOUT APPROVAL	J.ANTONOVICH	12/27/00
MECHANICAL APPROVAL		
CIVIL APPROVAL		
ELECTRICAL APPROVAL		
ENGINEERING MANAGER	P. DAWKINS	12/27/00
PROJECT DIRECTOR	W. ASTL	12/27/00

NEWINGTON ENERGY, LLC
NEWINGTON ENERGY

PLOT PLAN

SCALE	DRAWING NUMBER	REV.
1"=50'	427000-0-PP-5-1	2

MANUAL CHANGES MADE - YES ☐ NO ☐ DWG. FILE UPDATED - YES ☐ NO ☐ MODEL UPDATED - YES ☐ NO ☐ MODEL NAME:

CONTRACT PKG.
CADD FILE No.
WRK. PKG.
DIST. CODE 051
F:\Engineering\Layout\Plot Plan\Current\00-pp-5-1_2.dgn

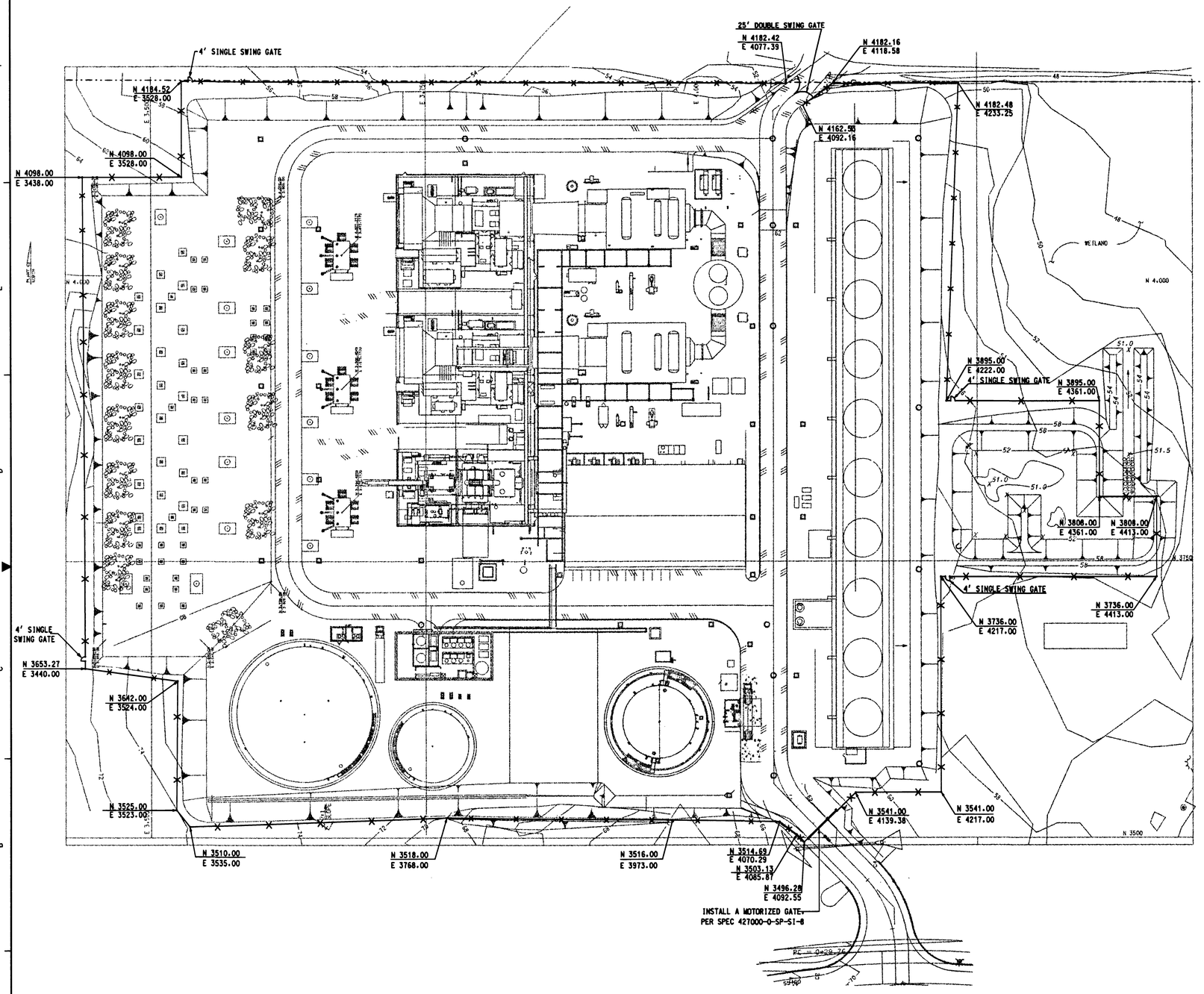
dwgbrd_327.d

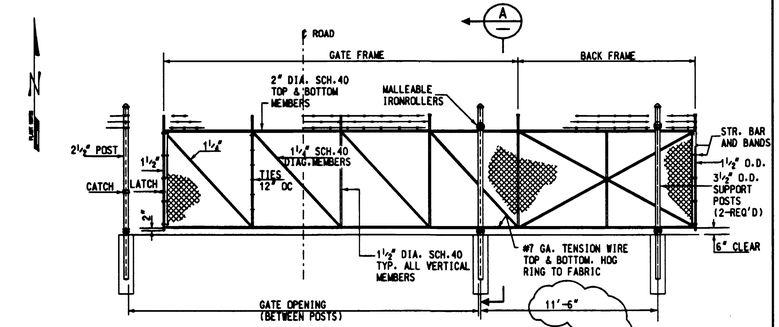
Plot User LAZC1113
Plot Date & Time 27-DEC-2000 07:42

*DATE*TIME*

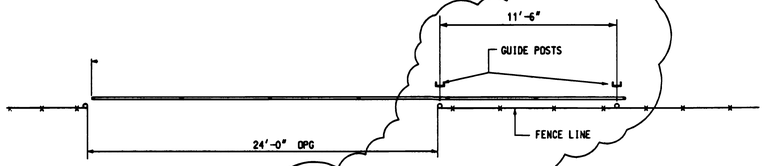
Figure 3

Facility General Layout &
Site Evacuation Map (Exits/Rally Points - Muster Areas)

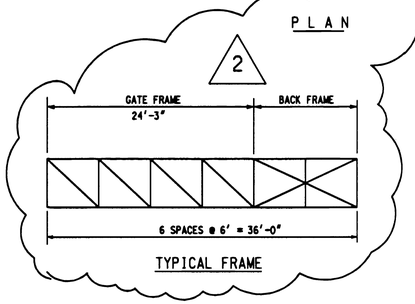




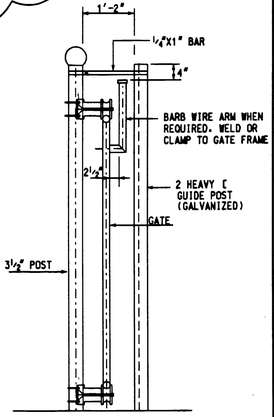
24' OPENING - SLIDING GATE DETAIL
(MODIFY AS REQ'D WHEN INSTALLING MOTOR)



PLAN



TYPICAL FRAME



SECTION A
SCALE: NTS

DIG SAFE
CALL BEFORE YOU DIG
CONTACT DIG SAFE 72 HOURS
PRIOR TO CONSTRUCTION

3/8/01
STEVEN D. YAMANOHA
No. 10213
LICENSED
PROFESSIONAL ENGINEER

NOTE:
FOR CHAIN LINK FENCE SPECIFICATION
SEE SPEC. 427000-0-SP-S1-8

0 50' 100' 200'
GRAPHIC SCALE

REV.	DATE	REVISION DESCRIPTION	DRWN CHK.	LAYO MECH	CIVIL ELEC	ENGM PROJ
0	2/8/01	ISSUED FOR REVIEW & APPROVAL	HS AQ			
1	3/1/01	APPROVED FOR CONSTRUCTION	HS AQ		SHY	RPD
2	3/8/01	REVISED SLIDING GATE DETAIL	HS AQ		SHY	RPD

REV.	DATE	REVISION DESCRIPTION	DRWN CHK.	LAYO MECH	CIVIL ELEC	ENGM PROJ

DWG.NO.

REFERENCE DRAWINGS

DUKE/FLUOR DANIEL

NOTICE: THIS DRAWING HAS NOT BEEN PUBLISHED AND IS THE SOLE PROPERTY OF DUKE/FLUOR DANIEL AND IS LENT TO THE BORROWER FOR THEIR CONFIDENTIAL USE ONLY, AND IN CONSIDERATION OF THE LOAN OF THIS DRAWING, THE BORROWER PROMISES AND AGREES TO RETURN IT UPON REQUEST AND AGREES THAT IT SHALL NOT BE REPRODUCED, COPIED, LENT OR OTHERWISE DISPOSED OF DIRECTLY OR INDIRECTLY, NOR USED FOR ANY PURPOSE OTHER THAN FOR WHICH IT IS FURNISHED.

DRAWN BY H.SARMIENTO	INITIALS/DATE HS 2/8/01	
CHECKED BY A.QUINONES	INITIALS/DATE AQ 2/8/01	
LAYOUT APPROVAL	INITIALS/DATE	
MECHANICAL APPROVAL	INITIALS/DATE	
CIVIL APPROVAL S. YAMANOHA	INITIALS/DATE SHY 2/8/01	
ELECTRICAL APPROVAL	INITIALS/DATE	
ENGINEERING MANAGER P. DAWKINS	INITIALS/DATE PD 2/8/01	
PROJECT DIRECTOR	INITIALS/DATE	

NEWINGTON ENERGY, LLC
NEWINGTON ENERGY

FENCING
PLAN

SCALE	DRAWING NUMBER	REV.
1"=50'	427000 0-CV-0-FE-11	2

MODEL NAME:

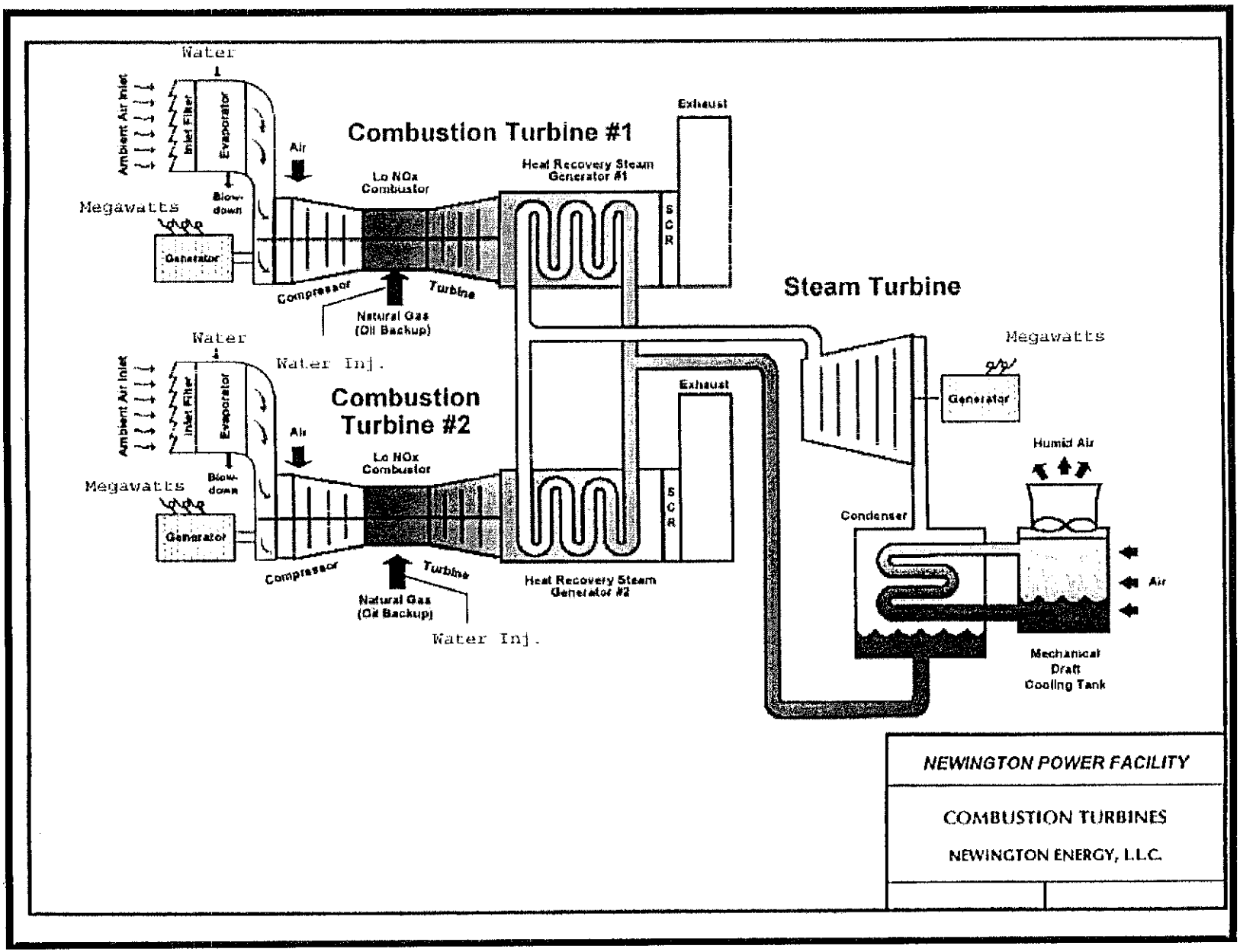
Plot User
Plot Date & Time
08-MAR-2001 12:55

=DATE=TIME= MANUAL CHANGES MADE - YES ☐ NO ☐ DWG. FILE UPDATED - YES ☐ NO ☐ MODEL UPDATED - YES ☐ NO ☐

CONTRACT PKG.
CADD FILE No.CVDRT.DGN
WRK. PKG.
DIST. CODE 053
n:\pds\civil\dwgs\roughgrading\cv01fe11.dgn
dwgbrd_327.d

Drawing 1

Process Block Flow Diagram

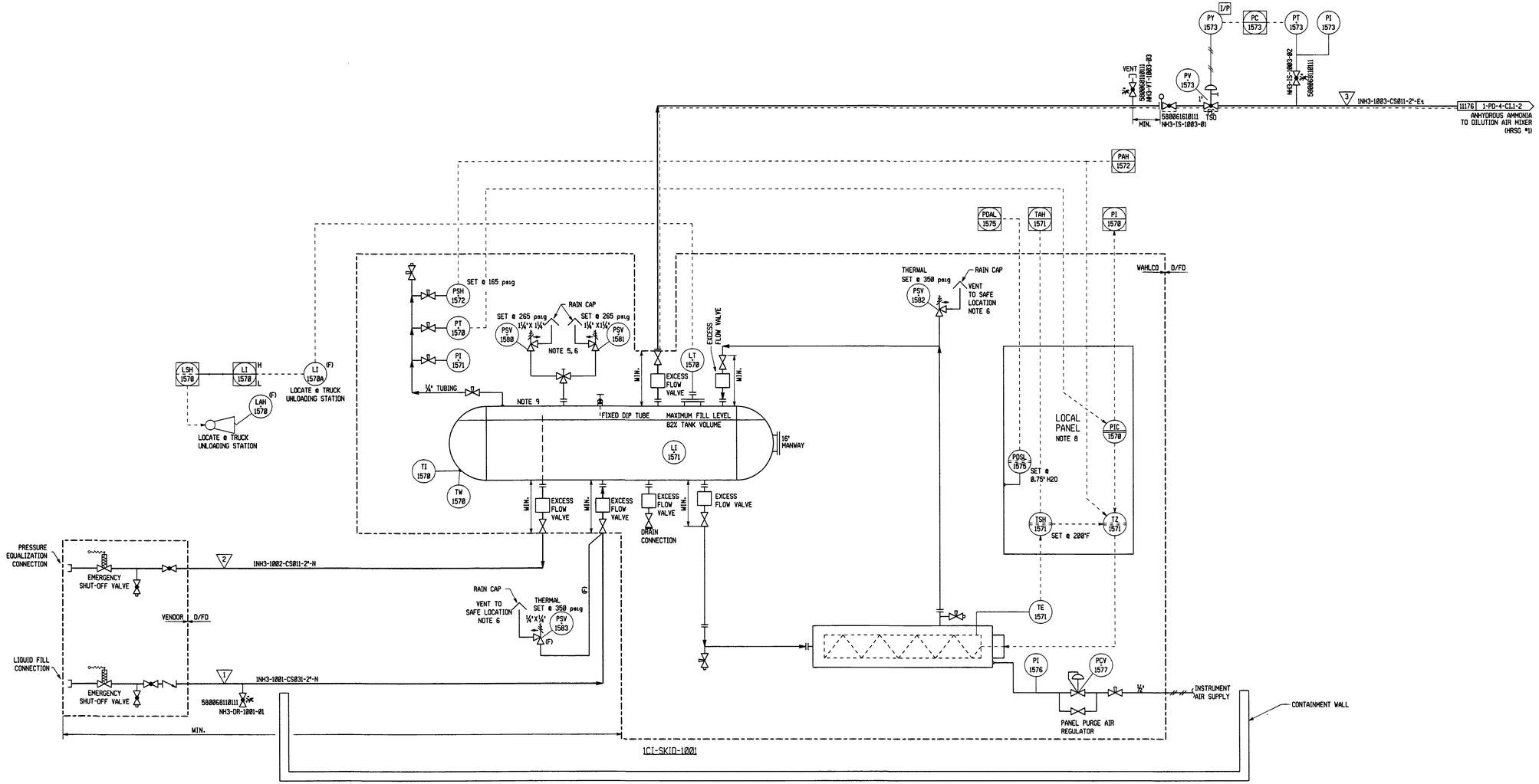

Water
Ambient Air Inlet
Inlet Filter
Evaporator
Air
Combustion Turbine #1
Lo NOx Combustor
Heat Recovery Steam Generator #1
Exhaust
S C R
Megawatts
Blow-down
Generator
Compressor
Turbine
Natural Gas (Oil Backup)
Steam Turbine
Water
Water Inj.
Combustion Turbine #2
Megawatts
Generator
Humid Air
Condenser
Air
Mechanical Draft Cooling Tank
Heat Recovery Steam Generator #2
Water Inj.
NEWINGTON POWER FACILITY
COMBUSTION TURBINES
NEWINGTON ENERGY, L.L.C.

Drawing 2

P&ID Anhydrous Ammonia Storage & Distribution

1CI-SKID-1001
ANHYDROUS AMMONIA STORAGE
AND VAPORIZATION SKID
STORAGE TANK CAPACITY: 2000 GAL
VAPORIZER DUTY: 40 KW

NOTES:
1. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY 1CI-XXXX.
2. USE OF COPPER OR COPPER BEARING ALLOYS IS NOT PERMISSIBLE IN AMMONIA SERVICE.
3. ALL EQUIPMENT IN AMMONIA SERVICE WILL BE POST WELD HEAT TREATED.
4. AMMONIA STORED WILL BE MINIMUM 0.2 WT % WATER AND UP TO MAXIMUM 0.5 WT % WATER. ALL EQUIPMENT AND RELATED PIPING IN AMMONIA SERVICE WILL BE STRESS RELIEVED TO PREVENT STRESS CORROSION CRACKING.
5. TWO 100% CAPACITY RELIEF VALVES PROVIDED.
6. ALL PSV DISCHARGE OPENINGS SHALL HAVE SUITABLE LOOSE FITTING RAIN CAP THAT WILL ALLOW FREE DISCHARGE OF AMMONIA VAPOR AND PREVENT ENTRANCE OF WATER.
7. A COMMON RETENTION AREA ADEQUATE TO CONTAIN THE TOTAL CONTENTS OF BOTH AMMONIA SKIDS, 1CI-SKID-1001/2001 (INCLUDING DRUMS AND VAPORIZERS) AND INLET FILL CONNECTIONS, SHALL BE PROVIDED.
8. VENDOR (WAHLCO) WILL PROVIDE PIC CONTROLLER TO MODULATE THE HEATER TO MAINTAIN THE STORAGE DRUM PRESSURE. FOR DCS PRESSURE INDICATION, I/I CONVERTER IS ALSO PROVIDED.
9. SPECIAL COUPLING WITH NO. 54 DRILL ORIFICE SIZE.



PROCESS CONDITIONS - STREAM No.							
DESIGN PRESSURE / TEMPERATURE	265.8 psig/178 deg F	265.8 psig/178 deg F	265.8 psig/178 deg F	265.8 psig/178 deg F	265.8 psig/178 deg F	265.8 psig/178 deg F	265.8 psig/178 deg F
OPERATING PRESSURE / TEMPERATURE	180.8 psig/105 deg F	180.8 psig/105 deg F	180.8 psig/105 deg F	52.8 psig/105 deg F	52.8 psig/105 deg F	52.8 psig/105 deg F	52.8 psig/105 deg F
MEDIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA
PHASE	LIQUID	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR	VAPOR
INSULATION	N	N	N	N	N	N	E1
REMARKS							

REV.	DATE	REVISION DESCRIPTION	DES.	CHK.	APPROVED
0	07/18/00	FOR REVIEW AND APPROVAL	SN	BJ	BEJ / BEJ for RPD
		CONSIDERED AFD PER CLIENT REVIEW MEETING			
		(EMAIL DATED 7-31-00)			
1	10/05/00	APPROVED FOR DESIGN	SN	BJ	BEJ / RPD
2	01/26/01	APPROVED FOR CONSTRUCTION	SN	BJ	BEJ / BEJ for RPD
3	11/09/01	APPROVED FOR CONSTRUCTION (GENERAL REVISION)	SN	BJ	BEJ / RPD

D/FD_D.DGN 11-20-99

REV.	DATE	REVISION DESCRIPTION	DES.	CHK.	APPROVED

DWG.NO.	REFERENCE DRAWINGS

*DATE*TIME* MANUAL CHANGES MADE - YES ☐ NO☐ DWG. FILE UPDATED - YES ☐ NO☐ MODEL UPDATED - YES ☐ NO☐

DUKE/FLUOR DANIEL sm

DESIGNED BY	S. NGO
CHECKED BY	B. JACOBSON
SUPERVISOR	B. JOHNSON
APP. DATE	
LEAD ENGR./SPECIALIST	B. JACOBSON
INITIALS	BEJ 10/13/00
PROJECT	R. DAWKINS
APP. DATE	RPD 10/16/00
CLIENT	
APP. DATE	

NEWINGTON ENERGY, L.L.C.
NEWINGTON ENERGY
NEWINGTON, NEW HAMPSHIRE

PIPING & INSTRUMENTATION DIAGRAM
CHEMICAL INJECTION SYSTEM (CI)
ANHYDROUS AMMONIA STORAGE & DISTRIBUTION

SCALE	DRAWING NUMBER	REV.
NONE	04427000-1-PD-4-CI.1-1	3

CONTRACT PKG.
CADD FILE No. 1p4ci1.pd
WRK. PKG.
DIST. CODE 004

Drawing 3

P&ID SCR Ammonia/Air Injection

NOTES:

1. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY 1CI-XXXX.
2. FEED BACK FROM AI-1513/1533 AND FEED FORWARD SIGNAL BASED ON CALCULATED NOX. AI-1535 & AI-1000 ARE USED TO CALCULATE NH3 TRIM & FEED FORWARD COMPONENT TO SET FC-1600. REFER TO VENDOR (FW) PROVIDED SAMA DIAGRAM 61-7705-4-6152 FOR DETAILS.
3. THE DUCT BURNER INLET NOX TO THE SCR IS CALCULATED IN THE DCS BASED ON THE AMOUNT OF FUEL GAS FIRED.
4. DILUTION AIR START PERMISSIVE FLOW (GREATER THAN 3000 LB/HR) FOR OPENING 1CI-FV-1600.
5. SKID FABRICATOR TO ROUTE INSTRUMENT AIR TO USERS.
6. DILUTION AIR TEMP > 150°F IS A PERMISSIVE TO START NH3.
7. OVERLOAD/THERMOSTAT PROTECTION.
8. ON GTG SWITCHOVER FROM FUEL GAS TO FUEL OIL, AI-1513 WILL BE SWITCHED TO AI-1533.
9. HEAT TRACING ON DRAIN LINE WILL BE PROVIDED BY D/FD.
10. DILUTION AIR HEATERS ARE NOT REQUIRED FOR THE NORMAL OPERATION OF THE SELECTIVE CATALYTIC REDUCTION (SCR) SYSTEM. DURING HRSG LAY-UP PERIODS, THE AIR HEATERS COULD BE USED TO SEND HOT AIR THROUGH THE CATALYST BED TO KEEP RELATIVE HUMIDITY BELOW 70% AND AVOID CONDENSATION ON THE CATALYST SURFACES.
11. PULSE OUTPUT WILL OPEN THE PURGE VALVE FOR THE DURATION ON TRIP OF NH3 AND THEN CLOSE THE PURGE VALVE.

PROCESS CONDITIONS - STREAM No.	1	2
DESIGN PRESSURE / TEMPERATURE	250.0 psig 170 degF	25.0 psig 300 degF
OPERATING PRESSURE / TEMPERATURE	52.0 psig 45 degF	1.0 psig 225 degF
MEDIA	ANHYDROUS AMMONIA	ANHYDROUS AMMONIA
PHASE	VAPOR	VAPOR
INSULATION		
REMARKS	Et	Et

REV.	DATE	REVISION DESCRIPTION	DES. CHK.	APPROVED
0	07/05/00	FOR REVIEW AND APPROVAL	SN BJ	BEJ BEJ for RPD
		PER CLIENT REVIEW MTG (EMAIL 7-31-00)		
		(EMAIL DATED 7-31-00)		
1	10/05/00	APPROVED FOR DESIGN	SN BJ	BEJ RPD
2	01/26/01	APPROVED FOR CONSTRUCTION	SN BJ	BEJ BEJ for RPD
3	11/09/01	APPROVED FOR CONSTRUCTION (GENERAL REVISION)	SN BJ	BEJ RW

DWG.NO.	REFERENCE DRAWINGS

DUKE/FLUOR DANIEL

DESIGNED BY	S. NGO	
CHECKED BY	B. JACOBSON	
SUPERVISOR	B. JOHNSON	APP. DATE
LEAD ENGR./SPECIALIST	B. JACOBSON	INITIALS BEJ 10/13/00
PROJECT	R. DAWKINS	APP DATE RPD 10/16/00
CLIENT		APP. DATE

NEWINGTON ENERGY, L.L.C.
NEWINGTON ENERGY
NEWINGTON, NEW HAMPSHIRE

PIPING & INSTRUMENTATION DIAGRAM
CHEMICAL INJECTION SYSTEM (CI)
SCR AMMONIA/AIR INJECTION

SCALE: NONE | DRAWING NUMBER: 04427000-1-PD-4-CI.1-2 | REV. 3

*DATE*TIME* MANUAL CHANGES MADE - YES ☐ NO☐ DWG. FILE UPDATED - YES ☐ NO☐ MODEL UPDATED - YES ☐ NO☐

D/FD_D.DGN 11-20-99

CADD FILE No. 1pd4ci12.pd DIST. CODE 004 WRK. PKG. CONTRACT PKG.

Appendix A

SCR System Description

Operating Procedure

Anhydrous Ammonia System / SCR

Approved By: *Operations Manager*	**Signature:**	**Date: 2/29/08**

1.0 PURPOSE

This operating procedure describes the required steps and the associated information to safely perform Anhydrous Ammonia Storage and Injection system component start up and shutdown and operate this system and components under normal conditions and within specified operating limits.

2.0 SYSTEM DESCRIPTION

Ammonia has many applications. One important application is that for selective catalytic reduction (SCR) of air pollutants (nitrogen oxides) generated from the burning of fuel used to create electricity. The predominant source of nitrogen oxides (NOx) emissions from natural gas turbines is the thermal NOx formation reaction, which is very dependent on combustor design. This reaction converts natural atmospheric nitrogen (N_2) and O_2 to NOx at the high temperatures of combustion.

SCR is post-combustion gas treatment techniques used for the reduction NO and NO_2 in the turbine exhaust stream to molecular nitrogen and water. Aqueous or anhydrous ammonia (NH_3) is typically used as the reducing agent. The basic reactions are:

$$4\ NH_3 + 4\ NO + O_2 \rightarrow 4\ N_2 + 6\ H_2O$$

$$8\ NH_3 + 3\ NO \rightarrow 7\ N_2 + 12\ H_2O$$

Typically a fixed-bed catalytic reactor is used for the SCR. The function of the catalyst is to lower the activation energy of the NOx decomposition reaction with ammonia.

The three basic steps of the process are as follows.

1. Draw Ammonia gas from the storage tank to the dilution skid.
2. Generate air (via the air blower on the ammonia flow control unit) and mix it with the ammonia such that the ammonia/oxygen mixture is at the proper concentration and temperature for catalytic conversion of the NOx to nitrogen and water.
3. Inject the ammonia/air mixture uniformly into the generator exhaust ducts through a system of manifolds, injection probes, and injection nozzles to achieve the effective mixing and conversion of NOx to nitrogen and water.

The major components of the ammonia SCR system are listed below:

Components	Description
Storage Tank	2,000 gallon tank
Ammonia Vaporizers	Two (2) electrically operated 40 kW vaporizers
Ammonia Flow Control Unit	Provided by The Dumont Group
Piping	ASTM A-106 Grade B seamless schedule 80 welded pipe used to transfer ammonia through the vaporizer loop and from the tank to the ammonia flow control unit.

The procedures provide details to be used to operate the ammonia SCR system.

Caution – Hazards of Ammonia

Anhydrous ammonia is present within the SCR system as a liquid and as a gas. Anhydrous ammonia is much more concentrated than household ammonia and because of this concentration, it is much more dangerous to people exposed to it. Anhydrous ammonia is listed as an Extremely Hazardous Substance. High pressures in the storage tank raise its boiling point so it is a liquid in those areas, but when the pressure is reduced the ammonia will become vapor. Liquid ammonia that is exposed to the atmosphere will evaporate very quickly, creating a potential inhalation hazard. Ammonia is very corrosive to skin, eyes, lungs, and other human tissue. Avoid coming in contact with anhydrous ammonia or breather its vapors. Fortunately, the pungent, irritating odor of ammonia, and its irritating effects can be detected by most people at very low concentrations providing early detection of releases.

Although ammonia does not meet OSHA's definition of a "flammable gas" , it will burn at certain concentrations (15%-28% flammable range). Mixtures of ammonia and oil mists are much more flammable and can ignite at concentrations near 3000 ppm. Extra caution should be exercised if an ammonia/oil mist is visible.

3.0 REFERENCES

The following references should be reviewed prior to performing this operating procedure:

3.1 Reference Documents

3.1.1 16358411/16358421, Hitachi Operation, Maintenance and Safety Manual for Selective Catalytic NOx Reduction System Catalyst.

3.1.2 The Dumont Group O&M Manual for Dilution Air Skid (01074 Manual)

3.1.3 Foster Wheeler HRSG Operation and Maintenance Manual

3.1.4 Foster Wheeler Care and Operation of SCR System

3.1.5 Wahlco, Inc. O&M Manual – Project No. 2094

3.1.6 Material Safety Data Sheets (MSDS) for Anhydrous Ammonia

3.2 Reference Drawings

3.2.1 Duke Fluor Daniels Ammonia Injection System P&ID's:

P&ID # 04427000-1-PD-4-CI.1-1 Rev.7

P&ID # 04427000-1-PD-4-CI.1-2 Rev.5

P&ID # 04427000-1-PD-4-CI.2-1 Rev.8

P&ID # 04427000-1-PD-4-CI.2-2 Rev.5

P&ID # 04427000-1-PD-4-HR.1-6 Rev.4

P&ID # 04427000-1-PD-4-HR.2-6 Rev.3

3.2.2 Roy E. Hanson Drawing for Anhydrous Ammonia Tank

4.0 SPECIAL TOOLS/EQUIPMENT

The following tools and equipment should be staged prior to performing this operating procedure:

- Personal Protective Equipment (hardhat, safety glasses, gloves, etc)
- Copy of Operating Procedure
- Flashlight (if applicable)
- Radio

5.0 GENERAL NOTES

5.1 Safety Symbol Legend

In the Operating Instructions the following standard format is used:

Warning

Commands attention to an operating procedure, practice, condition or statement, which, if not strictly observed, could result in personal injury or death.

Caution

Commands attention to an operating procedure, practice, condition or statement, which, if not strictly observed, could result in damage to, or destruction of equipment.

Notice

Commands attention to an essential operating or maintenance procedure, condition or statement that must be highlighted.

6.0 GENERAL PRECAUTIONS

Caution

Particular attention should be given to normal operating conditions of the system, its equipment, and components to detect variations from their normal conditions and function. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible**.

Caution – Precaution to Prevent Exposure

Each employee involved in the handling of Anhydrous Ammonia while performing specific job functions will be required to wear gloves, goggles and a protective over garment.

The SCR system has engineering controls, including cutout switches and pressure relief valves, to minimize the danger of ammonia exposure due to equipment failure. These controls are described in the following sections.

Caution – Quality Control and Inventory Control

Impurities in the chemicals used in the system can damage the equipment and cause increased equipment wear, plugging, or corrosion. In order to ensure that the correct raw material grades are used, NEL uses reliable vendors and primarily metallurgical grade anhydrous ammonia. Commercial Grade anhydrous ammonia may be used as required, but only with Operations Manager and Facility Manager approvals.

Ammonia is delivered directly to the ammonia storage tank on site. Ammonia is typically ordered in 2,000-gallon quantities and added directly to the storage tank on an as-needed basis. No cylinders for topping off the system are kept on site.

Caution – Consequences of Deviations

Operation of the ammonia system without following proper procedures can result in reduced employee safety, reduced equipment efficiency, premature equipment failure, increased repair and maintenance expenses, and/or release of ammonia to the workplace or environment.

See the following sections of this SOP as well as the Process Hazard Analysis documentation in the PSM written program manual for consequences of deviations from operating limits established for specific equipment.

7.0 NORMAL START-UP

7.1 Start-up Precautions and Limitations

Caution

Particular attention should be given to normal operating conditions of the system, its equipment, and components to detect variations from their normal conditions and function. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible**.

Caution

Contact with Liquid Anhydrous Ammonia causes severe burns of the eyes and skin. The liquid "FREEZES" the skin on contact, although the skin is still being subjected to severe chemical burns.

Caution

During the first few hours of fans, blowers, pumps, motors, etc. and overall system operation, check the equipment and system frequently for such conditions as excessive heating of bearings, vibration, unusual noises, etc. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible.**

Caution

Operating Limits: Never exceed the rated working pressure ratings of the storage tank or transfer hose during system recharge. The maximum allowable working pressure of the ammonia storage tank is 265 psi at 170°F. Do not overfill the storage tank. The tank should not be filled more than 82% full. Check the level before and during the ammonia charging operation to ensure that 82% level is not exceeded.

Consequences of Deviations: Over-pressuring the storage tank or transfer hose can cause the equipment to rupture or relief valves to lift resulting in release of ammonia. This may damage equipment and cause injury to workers due to sudden release of pressure and/or exposure to ammonia.

Improper hose connections or use of defective hoses can result in ammonia leaks. This can expose workers to sudden release of pressure and/or exposure to ammonia liquid and /or vapor.

Over filling the ammonia storage tank can result in inefficient operation of the system and possible damage to equipment.

Normal operation of the vessels uses float switches and pressure cutouts to control liquid levels, and protect against over-pressure, but operators need to be aware of the safe operating range and adhere to it in all modes of operation.

Action to Correct Deviations: Report low levels to the Operations Manager. A low level in the storage tank indicates that the system requires recharging. Excessive ammonia loss may be an indication of leaks in the system and should be investigated and corrected.

Increases of ammonia level above the normal operating level may indicate that the SCR system is malfunctioning. This situation should be reported to the Operations Manager and investigated.

Deviations above the maximum allowable pressure are dangerous and can cause failure of the equipment, which can result in injury or death due to sudden release of pressure and anhydrous ammonia. The SCR system is equipped with high-pressure switches and pressure relief valves to prevent this from occurring. Shut the system down immediately and notify the Operations Manager if this occurs

Special Precautions: When working on ammonia system equipment during maintenance or repairs, always use the buddy system and follow lock-out/tag-out, confined space entry, and equipment isolation and evacuation procedures.

Table 1 – Setpoints

Anhydrous Ammonia System	
Ammonia Line Pressure Regulator Setpoint	50 psig
Ammonia Storage Tank Pressure Relief Valves PSV-101, 102, 103, 104 Setpoints	265 psig
Ammonia Storage Tank Fill Line Pressure Relief Valve PSV-1583/2583 Setpoint	350 psig
Ammonia Vaporizer Loop Pressure Thermal Relief Valve PSV-1582/2582 Setpoint	350 psig
Ammonia Vaporizer Temp. Switch High	200 deg. F
Ammonia Tank Maximum Operating Level	82% capacity

7.2 Start-up Pre-requisites

Table 2

Step Number	Step
1.	Line up the electrical components in the system in accordance with Appendix A. Variations in line-up configurations are to be expected in the event of OOS (Out of Service) equipment/transfers or maintenance and their status will be recorded per plant administrative procedures.
2.	Line up the system in accordance with Appendix B, C, & D. The pre-start up valve line-ups are only required for initial system start up or following major system maintenance. Variations in line-up configurations are to be expected in the event of OOS (Out of Service) equipment/transfers or maintenance and their status will be recorded per plant administrative procedures.
3.	Verify that the plant A.C. Electrical System is in operation per Operating Procedure 5.01.
5.	Verify that the plant Instrument Air System is in operation per Operating Procedure 4.18.
6.	Verify the integrity of the Ammonia Storage System and the SCR Ammonia Injection System by performing operator walk down.
7.	Verify that there are no "OPEN" work orders for the Ammonia system that will affect the safe operation of the system.
8.	Verify Sufficient Level in the Ammonia Storage Tank for proper operation of the Ammonia System.
END	**END**

7.3 Local Start Up Anhydrous Ammonia Storage System

Table 3

Step Number	Step
1.	Verify that all start-up Pre-requisites have been completed per Table 2
2.	At local control panel close in Circuit Breaker CB-1
3.	At local control panel place the control power switch **H-03** to "ON"

4.	At local control panel select the vaporizer (heater)to be put in service. Vaporizer selection can only be made from the local control panel. Press the green Check mark and the selected vaporizer will now function in Automatic to control to the pressure setpoint of 100psig using 1CI-PIC-1570/2570..
5.	Monitor the system for any leaks or any abnormal operation as pressure builds to normal state of 100 psig.
END	**END**

7.4 Remote Start up Anhydrous Ammonia Storage System

NOTE:	**REMOTE START-UP IS NOT AVAILABLE WITH THE ANHYDROUS AMMONIA STORAGE SYSTEM. MONITORING OF PRESSURES AND TEMPERATURES "ONLY" CAN BE MONITORED THROUGH THE PLANT DCS SYSTEM.**

7.5 Ammonia vaporizers

Ammonia Vaporizers Precautions and Limitations

Caution

Operating Limits: Never exceed the rated working pressure ratings of the vaporizers. The maximum allowable working pressure of the ammonia vaporizers is 265 psi at 160°F. The vaporizers are rated for 40kW, 480 Volt, 3 phase.

Consequences of Deviations: Over-pressuring the vaporizers can cause the equipment to rupture or relief valves to lift resulting in release of ammonia. This may damage equipment and cause injury to workers due to sudden release of pressure and or exposure to ammonia.

Normal operation of the vaporizer is designed to maintain tank pressure during periods of cold weather for heating and vaporizing liquid ammonia. And over temperature switch shuts off power to the heater elements when the operating temperature of the vaporizer exceeds 200°F. System operators must be aware of the safe operating range and adhere to it in all modes of operation.

The vaporizer must be kept flooded with liquid ammonia to prevent overheating of the elements when activated. Therefore, block valves upstream and downstream of both vaporizers must be open.

Actions to Correct Deviations: Deviations above the maximum allowable pressure are dangerous and can cause failure of the equipment, which can result in injury or death due to sudden release of pressure and anhydrous ammonia. The vaporizers are equipped with high pressure and high temperature switches as well as pressure relief valves to prevent this from occurring. Shut the system down immediately and notify the Operations Manager if this occurs.

Special Precautions: The SCR system is equipped with high pressure and high temperature cutouts as well as relief valves to protect the vaporizers form over pressurization.

When working on the ammonia system equipment during maintenance or repairs, always use the buddy system and follow lock-out/tag-out, confined space entry and equipment isolation and evacuation procedures.

The vaporizer skid contains one 40kW vaporizer for each storage tank.

The vaporizer maintains ammonia tank pressure during periods of cold weather by heating and vaporizing liquid ammonia. Liquid NH_3 flows by gravity from the storage tank to the vaporizer. The vaporizer is located below the tank so that the heater elements are always flooded; all block valves upstream and downstream of the vaporizer must be open. Ammonia gas produced by the vaporizer is returned to the tank vapor space.

A pressure transmitter on the storage tank (1CI-PI-1570/2570) provides the process input to the pressure indicating controller (1CI-PC-1570/2570), which controls the current input to the vaporizer heating elements. An over temperature switch shuts off the power to heater elements when the operating temperature exceeds 200°F. Tank pressure and vaporizer over temperature alarm signals are sent to the DCS.

Ice build-up on certain components of the ammonia SCR equipment may be indicative of damage to the vapor seals of the insulation. Such ice buildup should be reported to the Operations Manager, and ice should be removed. Be careful not to damage equipment when removing ice. Never strike the equipment when attempting to remove ice, but rather, use warm water or warm air to remove ice buildup from ammonia equipment.

7.6 Ammonia/Air Flow Control Unit (AFCU) Procedures

7.7 System Blower Skid Start Up Prerequisites

Step Number	Step
1.	Before starting the blower skids, check that the liquid ammonia storage/vaporizer system is operating and open to the ammonia system skids. .
2.	Be sure to pull out the " Emergency Stop" pushbuttons for the Dilution Air Blowers A/B (1CI-BLR-1001A/B or 1CI-BLR-2001A/B) .
3.	From the blower selector switch in the DCS, start blower 1CI-BLR-1001A/B or 1CI-BLR-2001A/B and verify that the selected blower is running at the DCS and the stand-by is in **"Auto"**.
4.	From the DCS, verify that the air flow is in the NORMAL flow condition. This will have been verified by adjusting manual valve (1CI-HCV-101A/B or 1CI-HCV-201A/B) until flow transmitter 1CI-FT-1602/2602 registers >3000 Lbs/hr.
5.	From the DCS, energize the solenoid valve 1CI-HS-1601/2601 via the pushbutton HS-1601/2601. This will start the ammonia injection by opening flow valve 1CI-HV-1601/2601.
END	**END**

7.8 Ammonia Air Flow Control Start Up

Step Number	Step
1.	Close all circuit breakers at the control panel.
2.	At the DCS, the system should indicate alarms such as "low Instrument Air Pressure, Low NH_3 Vapor Pressure, Low NH_3 Vapor Flow, and Low Dilution Air Flow"
3.	Open the instrument air valve at Dilution Air Skid and set the air pressure at regulator 1CI-PCV-1624/2624 to 60 psig.

4.	The system should be in the "System Stop" mode. At this time, check that the 1/8" diameter flex tubing at each orifice flange tab have been installed and the block valves at each manifold sub-header are open.
5.	At the DCS, start blower A or B; the selected blower will start; place other blower in the Auto/Standby position. Check and adjust the position of the main air flow valves of the selected blower (1CI-HCV-101/201A or 1CI-HCV-101/201B) to obtain "Normal Process Air" flow rate at 1CI-FT-1602/2602 of 3000lbs/hr.
6.	In the "Blower Running mode, only air is being injected into the flue gas stream. If an "Air Flow Low" alarm occurs, the system will start the backup blower; if the problem continues the system will trip and no ammonia can be injected.
7.	With the normal air flow, all equipment on the ammonia skid should be checked for air leaks, at the flanges, connections and fittings, and corrected if any are found . If air leaks are found, the system may be shutdown by pushing the "Emergency Stop" button to the blowers. If no air leaks are found, the air portion of the system is now ready for operation.
END	**END**

7.9 Ammonia Vapor Injection Run Pre-Requisites

Step Number	Step
1.	Manual Operation: From the DCS, manual or auto-operating modes can be selected. The ammonia flow in pounds per hour can be dialed for a selected flow. This is the manual mode of operation. In this mode, the flow of ammonia will remain the same even though other control signals vary, including the NOx tracking signal.
2.	Automatic Operation: When in automatic mode, the ammonia flow will follow the setpoint set in the DCS system. The ammonia flow control valve 1CI-FV-1600A/B or 1CI-FV-2600A/B will open and close to follow the 4-20mA NOx tracking signal received from the DCS system.
END	**END**

7.10 Instrument and Control Settings

Step Number	Step
1.	Main process air valves 1CI-HCV-101A/B or 1CI-HCV-201A/B set to normal air flow >3000 lbs/hr. as read at the DCS from the 4-20 mA signal from the air flow transmitter 1CI-FT-1602/2602.
2.	Ammonia vapor pressure control valve 1CI-PCV-1627/2627 set to 26.8 psig.
3.	Ammonia vapor pressure transmitter 1CI-PT-1621/2621 range of 0-30 psig corresponds to a linear 4-20 mA signal to the DCS for ammonia vapor pressure.

4.	Ammonia vapor temperature transmitter 1CI-TT-1600/2600 range of 0-257°F corresponds to a linear 4-20 mA signal to the DCS for ammonia vapor temperature.
5.	Ammonia vapor flow transmitter 1CI-FT-1600/2600 range of 0-30 inches H_2O pressure corresponds to a linear 4-20 mA signal to the DCS for ammonia vapor flow
END	**END**

7.11 Local Start-Up Anhydrous Ammonia Injection system (AFCU)

Step Number	Step
1.	Verify that all start-up Pre-requisites have been completed per Table 1
NOTE:	Step #1 above is the only Local Operator Interface available with this part of the Anhydrous Ammonia System. All other start-up interface available is through the remote start up utilizing the plant DCS **SEE REMOTE START-UP OF AMMONIA INJECTION SYSTEM PER TABLE 5.**
2.	After the AFCU system has been remotely started through the plant DCS, the outside operator will monitor the system for any leaks and abnormal operations of the AFCU system
END	**END**

7.12 Remote Start-Up Anhydrous Ammonia Injection System

Step Number	Step
1.	Verify that all start-up pre-requisites have been completed per Table 1**.**
2.	Verify that the Liquid Ammonia Storage/Vaporizer System is in operation and open to Ammonia Injection System Skids
3.	From the blower selector screen on the DCS, START Blower 1CI-BLR-1001A/2001A or 1CI-BLR -1001B/2001B and verify that the selected blower has running indication on the DCS.
4.	From the DCS verify that the airflow is in the **"NORMAL"** FLOW condition. This can be verified by adjusting manual valve **1CI-HCV-101A/B or 1CI-HCV-201A/B** until flow transmitter **1CI-FT-1602/2602** registers >3000 lb/hr (permissive to start injection system). If flow is less than 4000 lbs/hr, the DCS will generate an alarm and blower inlet filter should be checked/changed.
5.	From the DCS energize the solenoid valve to 1CI-HV-1601/2601 by selecting "**ON**" via the DCS hand switch HS-1601 or HS-2601. This will Start the Ammonia Injection by

	opening block valve 1CI-HV-1601/2601 and allow control of the flow valve 1CI-FV1600B/2600B (gas operations) or 1CI-FV-1600A/2600A (oil operations).
NOTE:	From the DCS manual Mode can be selected. The Ammonia Flow in LBS/HR can be manually adjusted for a selected flow. In this mode the flow of Ammonia will remain the same even though other control signals vary, including the NOx tracking signal. This should only be used in abnormal operating conditions when CEMS is in calibration or work is being done to the analyzers. This may also be necessary during equipment/signal malfunctions but should always be kept to a minimum.
NOTE:	From the DCS Automatic Operation Mode can be selected. When in the Automatic Mode the Ammonia flow will follow the setpoint set in the DCS system**.** The Ammonia flow control valve 1CI-FV1600A/B or 1CI-FV-2600A/B will open and close to follow the 4-20-mA NOx tracking signal received from the DCS System.
END	**END**

8.0 NORMAL OPERATION

8.1 Anhydrous Ammonia System Normal Operations

Step Number	Step
NOTE:	The Ammonia Storage System operates in the Automatic Mode. The Vaporizer can be switched "**ON/OFF**" only from the local control panel hand-switch (H-03). The Vaporizer in service will operate in automatic as pressure and temperature dictate. Pressures and temperatures can be monitored locally and from the DCS and except for system monitoring and walk-downs by the outside operator no other operator interface is necessary.
NOTE:	The Ammonia Injection System (AFCU) operates in the Automatic Mode (however, manual mode can be selected but Automatic Mode will be normal operations). One blower will be in operation, which requires that the other blower be in **"AUTO"** standby mode. Either Blower can be selected for operation from the DCS. Temperatures and pressures can be monitored locally. Temperatures, pressures and flows can be monitored from the DCS and except for monitoring system conditions from the DCS and locally by outside operator, no other operator interface is necessary
END	**END**

9.0 NORMAL SHUTDOWN

Caution

Immediately following shut down, check the system to verify that conditions are normal. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible**.

9.1 Shutdown Pre-requisites for Anhydrous Ammonia Storage System

Step Number	Step
1.	Shutting down the Anhydrous Ammonia system will only be allowed when the entire CT/HRSG train is to be shut down. Verify that shutting down the Anhydrous Ammonia system will not exceed the plants allowable Emissions discharge limits. Notify the Operations Manager if there is ever any question regarding the Air Permit and an exceedance possibility.
END	**END**

9.2 Local Shutdown Anhydrous Ammonia Storage System

Step Number	Step
1.	From local control panel turn H-03 to the "**OFF"** position
2.	For long term shutdown open circuit breaker CB-1
END	**END**

9.3 Remote Shutdown Anhydrous Ammonia Storage System

Step Number	Step
NOTE:	Remote shutdown is **NOT** available for the Anhydrous Ammonia Storage System
END	**END**

9.4 Local Shutdown Anhydrous Ammonia Injection System

Step Number	Step
NOTE:	Local shutdown is not available for the Anhydrous Ammonia Injection System. Except for emergencies only. Manual shutdown of the skid is accomplished via isolation of the valves to stop the flow locally. The dilution air blowers can be shutdown via "E-stops" for each blower.
END	**END**

9.5 Remote Shutdown Anhydrous Ammonia Injection System

Step Number	Step
1.	For normal shutdown, on the DCS controls, take HS-1601 or HS-2601 to the **"OFF"** position. This will cause the system to trip in the following order:
2.	The Ammonia flow valve 1CI-FV-1601/2601 will close via solenoid 1CI-HY-1601.
3.	The Ammonia pressure transmitter 1CI-PI-1621/2621 will send a signal to the DCS system of zero pressure.
4.	The Ammonia flow transmitter 1CI-FT-1600 will send a signal to the DCS system of zero Ammonia flow.
5.	The DCS system will then close the Ammonia flow control valve 1CI-FV-1600A/B or 1CI-FV-2600A/B.
6.	The ammonia purge air valve 1CI-FV-1603/2603 will open and commence a 30 second purge of the ammonia vapors in the piping. (An automatic timer in the DCS will close 1CI-FV-1603/2603 after 30 seconds.)
7.	For long term shutdown turnoff the main circuit breaker in the MCC.
END	**END**

9.6 Emergency Shutdown

1.	An "Emergency Stop" pushbutton HS-1135 is provided on the blower skid control to shutdown the blower system ONLY under true emergency conditions. When pressed, The DCS system will receive a signal that the "Emergency Stop" pushbutton has been pushed and the system will trip with no blowers running. The CT will need to be shutdown to prevent an emissions exceedance. Notify Operations Manager of events.
2.	The System should be restarted as soon as possible and put into at least the "Blower Running" mode.

END	**END**

9.7 Routine Inspections

Step Number	Step
1.	**Flanges and Gaskets:** Should disassembly of any part of the manifold or ducting be required, only standard machine shop practices are needed: a. Use special care to avoid damaging flange faces. b. Remove all burrs that would interface with a good seal c. When reinstalling, align faces carefully, and torque uniformly. d. Use a good quality high temperature gasket material.
2.	**Air Blowers:** Check the blower/motor alignment, grease bearings and periodically drain blower housings.
3.	**Ammonia Injection Grids:** The stainless steel probes should require no routine maintenance. However, during boiler outages, a shutdown inspection may be made for any corrosion at the injection orifices, and should be cleaned or blown out with high pressure plant air. Yearly catalyst coupon samples should be removed and sent to OEM for reaction analysis.
4.	**Lamp Bulbs**: Replace burned out lamp bulbs as necessary.
5.	**Air blower Inlet Filters:** Clean air blower inlet filters weekly, as required.
6.	**Interlocks and Alarms:** Test interlocks and alarms for proper actuation periodically when conditions permit.
END	**END**

10.0 EMERGENCY OPERATION

10.1 Emergency Shutdown

Caution

Immediately following shut down, check the system to verify that conditions are normal. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible**.

11.0 ALARMS AND EMERGENCY CONDITIONS

11.1 Alarms

Anhydrous Ammonia System/SCR Alarms and Actions to Be Taken

ALARM DESCRIPTION	ACTIONS	SETPOINT
Low Dilution Air Flow	- Check that the dilution air blower or blowers are running. - Check the filter in the blowers for obstructions/dirty filter	<3000 lbs./hr
Ammonia Storage Tank High Pressure	- Check to make sure that the heater is OFF. - If safe to approach area, turn heater off and monitor tank pressure - Inform Operations Manager of situation and if Environmental Air Permit is in jeopardy of being exceeded, shutdown the CT.	165 psig
Ammonia Tank High Level	- If filling tank, secure the offload process - If not filling tank, investigate cause to make sure that level transmitter is not damaged or wires are not disconnected.	80%
Ammonia Purge Panel Pressure Low	- Proceed to ammonia vaporizer and adjust the panel purge air flow higher or lower to clear alarm and put in the “green” safe range on flow indicator. -	Low = 0.750 “ h20
Ammonia Storage Tank Vaporizer High Temp.	- Investigate the heater controls and if the demand signal on the controller is not ramping down, turn heater controls to “OFF” via HS-03. -	200 ^{o}F

12.0 ROUTINE TESTS OF PROTECTION AND AUTOMATIC EQUIPMENT

13.0 SYSTEM OPERATIONAL MAINTENANCE

Component	ACTIONS	Frequency
Catalyst	During outages, inspect the catalyst for signs of wear, damage, or plugging. All debris, such as dust, iron rust, oil, and other impurities, should be cleaned from the catalyst and reactor housing with a vacuum cleaner. Vacuuming should be done with care not to damage the catalyst face. Keep the vacuum nozzle ¼ to ½ inch from the catalyst face. For plugged sections of catalyst that cannot be cleaned with a vacuum cleaner, it may be necessary to use compressed air in conjunction with a vacuum cleaner. Blow air from the downstream side of the catalyst to the upstream side, directed into the vacuum. NOTE: compressed air must be used with caution to prevent erosion of the catalyst from excessive pressure and velocity. See the catalyst vendor's manual for details on the use of compressed air for cleaning the catalyst. NEVER WATER WASH THE CATALYST.	Annual
Ammonia Injection Pipes	During outages, inspect the ammonia injection pipes, as required, to make sure all injection nozzles are clean. Any plugging or foreign matter should be removed or vacuumed off as this could affect NO_x reduction efficiency or ammonia slip by altering the ammonia distribution within the duct.	Annual
Ammonia Skids	-All piping should be walked down periodically to look for leaks. -Periodically inspect gages, regulators, valves, etc. to ensure they are in good working order. Periodically inspect and replace wear parts as necessary. -Strainers and filters should be changed and inspected at regular intervals.	Periodically
Ammonia Storage Tank	-Every 5 years the tank relief valves must be replaced. -Hydrostatic relief valves should be replaced at time of main tank relief valve replacement.	5 years

APPENDIX A PRE-STARTUP ELECTRICAL LINE UP

Voltage	Position	MCC/ Component Nomenclature
480	Closed	MCC-1EP-MC-A, 1CI-SKID-1001, Ammonia Storage Vaporizer Panel
480	Closed	MCC-1EP-MC-B, 1CI-SKID-2001, Ammonia Storage Vaporizer Panel
480	Closed	MCC-1EP-MC-B, 1CI-HTR-1001B, 1CI-JB-1001, Ammonia Dilution Skid Heater (AFCU)
480	Closed	MCC-1EP-MC-B, 1CI-HTR-2001B, 1CI-JB-2001, Ammonia Dilution Skid Heater (AFCU)

APPENDIX B SCR AMMONIA INJECTION SYSTEM (AFCU) TRAIN 1 PRE-START UP VALVE LINEUP

Notice

The valve type will determine the required position. If it is a **manual** valve, the position will either be designated as **open or closed**. If it is a **motor-operated** or **air-operated valve**, the position would reflect both the **control status** and the **valve position** (e.g. auto open, auto closed, manual open, or manual closed.

Tag	**Valve Number/Nomenclature**	Valve Type	Start Position
1CI-HCV-101A	Ammonia Dilution Blower A Discharge Valve	Butterfly	Throttle
1CI-HCV-101B	Ammonia Dilution Blower B Discharge Valve	Butterfly	Throttle
1CI-PCV-1627	Ammonia Pressure Regulator to Control Valves (28 psig)	Regulator	Setpoint
1CI-HCV-102A	Ammonia Dilution Air Heater A Inlet Valve	Butterfly	Open
1CI-HCV-102B	Ammonia Dilution Air Heater A Outlet Valve	Butterfly	Open
1CI-HCV-102C	Ammonia Dilution Air Heater B Inlet Valve	Butterfly	Open
1CI-HCV-102D	Ammonia Dilution Air Heater B Outlet Valve	Butterfly	Open
1CI-HCV-103A	Ammonia Control Valve 1CI-FV-1600B Inlet Valve	Globe	Open
1CI-HCV-103B	Ammonia Control Valve 1CI-FV-1600B Outlet Valve	Globe	Open
1CI-HCV-103C	Ammonia Control Valves Bypass Valve	Globe	Closed
1CI-HCV-103D	Ammonia Control Valve 1CI-FV-1600A Inlet Valve	Globe	Open
1CI-HCV-103E	Ammonia Control Valve 1CI-FV-1600A Outlet Valve	Globe	Open

APPENDIX C AMMONIA STORAGE TANK/VAPORIZER1CI-SKID-1001/2001 PRE-START UP VALVE LINEUP

Notice

The valve type will determine the required position. If it is a **manual** valve, the position will either be designated as **open or closed**. If it is a **motor-operated** or **air-operated valve**, the position would reflect both the **control status** and the **valve position** (e.g. auto open, auto closed, manual open, or manual closed.

Tag	**Valve Number/Nomenclature**	Valve Type	Start Position
1CI-CKV-0503	Ammonia Tank Fill Liquid Line Check Valves	Check	Closed
1CI-EFV/HV-0507	Ammonia Tank Fill Liquid Line Excess Flow Valve	Excess Flow	Open
1CI-EFV/HV-0508	Ammonia Tank Vapor Recovery Line Excess Flow Valve	Excess Flow	Open
1CI-EFV/HV-0509	Ammonia Tank Vaporizer Supply Line Excess Flow Valve	Excess Flow	Open
1CI-EFV/HV-0512	Ammonia Tank Vaporizer Discharge Line Excess Flow Valve	Excess Flow	Open
1CI-EFV/HV-0513	Ammonia Tank Vapor Outlet to Process Line Excess Flow Valve	Excess Flow	Open
1CI-EFV/HV-0515	Ammonia Tank Cross-Over Liquid Line Excess Flow Valve	Excess Flow	Open
1CI-ESV-0500	Ammonia Tank Fill Liquid Line Emergency Shutdown Valve	Air Operated	Closed
1CI-ESV-0504	Ammonia Tank Vapor Recovery Emergency Shutdown Valve	Air Operated	Closed
1CI-HV-0501	Ammonia Tank Fill Liquid Line Drain b/t ESV and 1CI-HV-0502	Manual	Closed
1CI-HV-0502	Ammonia Tank Fill Liquid Line Manual Block Valve	Manual	Closed
1CI-HV-0503	Ammonia Tank Vapor Recovery Drain b/t ESV and 1CI-HV-0506	Manual	Closed
1CI-HV-0504	Ammonia Tank Fill Liquid Line Drain b/t ESV and 1CI-HV-0502	Manual	Closed
1CI-HV-0505	Ammonia Tank Vapor Recovery Drain b/t ESV and 1CI-HV-0506	Manual	Closed
1CI-HV-0506	Ammonia Tank Vapor Recovery Line Manual Block Valve	Manual	Closed

1CI-HV-0510	Ammonia Vaporizer Supply Line Drain Valve	Manual	Closed
1CI-HV-0511	Ammonia Vaporizer Discharge Vent Valve	Manual	Closed
1CI-HV-0514	Ammonia Tank Pressure Relief Valve Change-over Valve	Manual	Mid Position
1CI-HV-0516	Instrument Manifold Isolation Valve	Manual	Open
1CI-HV-0517	Local Pressure Instrument Isolation Valve (1CI-PI-1571)	Manual	Open
1CI-HV-0518	Local Pressure Transmitter Isolation Valve (1CI-PT-1570)	Manual	Open
1CI-HV-0519	Local Pressure Switch High Isolation Valve (1CI-PSH-1572)	Manual	Open
1CI-HV-0520	Instrument Manifold Vent Valve	Manual	Closed
1CI-HV-0521	Liquid Level Dip Tube Isolation with Integral Vent Valve	Manual	Closed
1CI-PSV-1580/2580	Rego Pressure Relief Valve (365 psig)	Relief	N/A
1CI-PSV-1581/2581	Rego Pressure Relief Valve (365 psig)	Relief	N/A
1CI-PSV-1582/2582	Ammonia Vaporizer Discharge Line Relief Valve (350psig)	Relief	N/A
1CI-PSV-1583/2583	Ammonia Tank Fill Liquid Line Hydrostatic Relief (325psig)	Relief	N?A

APPENDIX D SCR AMMONIA INJECTION SYSTEM (AFCU) TRAIN 2 PRE-START UP VALVE LINEUP

Notice

The valve type will determine the required position. If it is a **manual** valve, the position will either be designated as **open or closed**. If it is a **motor-operated** or **air-operated valve**, the position would reflect both the **control status** and the **valve position** (e.g. auto open, auto closed, manual open, or manual closed.

Tag	**Valve Number/Nomenclature**	Valve Type	Start Position
1CI-HCV-201A	Ammonia Dilution Blower A Discharge Valve	Butterfly	Throttle
1CI-HCV-201B	Ammonia Dilution Blower B Discharge Valve	Butterfly	Throttle
1CI-PCV-2627	Ammonia Pressure Regulator to Control Valves (28 psig)	Regulator	Setpoint
1CI-HCV-202A	Ammonia Dilution Air Heater A Inlet Valve	Butterfly	Open
1CI-HCV-202B	Ammonia Dilution Air Heater A Outlet Valve	Butterfly	Open
1CI-HCV-202C	Ammonia Dilution Air Heater B Inlet Valve	Butterfly	Open
1CI-HCV-202D	Ammonia Dilution Air Heater B Outlet Valve	Butterfly	Open
1CI-HCV-203A	Ammonia Control Valve 1CI-FV-2600B Inlet Valve	Globe	Open
1CI-HCV-203B	Ammonia Control Valve 1CI-FV-2600B Outlet Valve	Globe	Open
1CI-HCV-203C	Ammonia Control Valves Bypass Valve	Globe	Closed
1CI-HCV-203D	Ammonia Control Valve 1CI-FV-2600A Inlet Valve	Globe	Open
1CI-HCV-203E	Ammonia Control Valve 1CI-FV-2600A Outlet Valve	Globe	Open

Ammonia Un-loading Procedure

See NEL Operating Procedures Hazardous Chemical Transfer Procedures

\\nhmhtf01psge\userdir\public\Operations\Chemical Transfer Procedures\NEL Operating Procedures Haz Chem SystemRev11.doc

Appendix B

RMP Submit

TRITON ENVIRONMENTAL, INC.
Environmental Consulting & Engineering

February 20, 2008

RMP Plan (RMP) Reporting Center
c/o CSC
Suite 300
8400 Corporate Drive
New Carrollton, MD 20785

RE: RMP Submit
Newington Energy, LLC – Newington, New Hampshire

To Whom It May Concern:

Please find enclosed a disk containing the Risk Management Plan (RMP) Submit 5-year recertification and signed Certification Statement for the Newington Energy, Newington, New Hampshire facility. The facility is subject to the RMP requirements as it operates a process with anhydrous ammonia using greater than 10,000 lb. Based on a review of available records, it appears that the original RMP submission occurred in November 2002. Therefore, this recertification submittal is three months late. We apologize for any inconvenience or confusion this may have caused.

While we understand that greater than 5 years has passed since the original submission, Newington Energy has operated the referenced process as originally certified with minimal changes. In addition, an inspection was recently completed by EPA Region 1 (Office of Environmental Measures and Evaluation - Jack Harvanek, P.E.) including a review of the facility RMP program. EPA indicated that there were no deficiencies in Newington Energy's RMP program.

If you should have any questions or comments, please contact me at 203.458.7200.

Sincerely,

Paul Simonetta
Senior Project Manager, CHMM

enclosure

cc: Mr. David Argyros, Newington Energy, LLC

Ref. No. 102692 RMP Submit Cover Feb 2008

Certification Letter

Certification Statement for Program Level 2 & 3 Processes

To the best of the undersigned's knowledge, information, and belief formed after reasonable inquiry, the information submitted is true, accurate, and complete.

Signature

Alan J. Douglass
Print Name

Env. Health & Safety Mgr.
Title

2/11/08
Date

EPA Facility ID # 1000 0018 0546

RMP Report for Newington Energy

Section 1. Registration Information

1.1 Source Identification: **Facility ID:** 1 There were no reportable accidents in the last 5 years

a. Facility Name: Newington Energy

b. Parent Company #1 Name: Newington Energy LLC/Consolidated Edison

c. Parent Company #2 Name: General Electric Power Systems

1.2 EPA Facility Identifier: 1000 0018 0546

1.3 Other EPA Systems Facility ID:

1.4 Dun and Bradstreet Numbers (DUNS):

a. Facility DUNS:

b. Parent Company #1 DUNS: 022934678

c. Parent Company #2 DUNS: 023647246

1.5 Facility Location Address:

a. Street 1: 200 Shattuck Way

b. Street 2:

c. City: Newington **d. State:** NH **e. Zip:** 03801 -

f. County: Rockingham

Facility Latitude and Longitude:

g. Lat. (dd.dddddd): 43.105000 **h. Long. (ddd.dddddd):** -070.806944

i. Lat/Long Method: S1 Classical Surveying Techniques

j. Lat/Long Description: AS Air Release Stack

k. Horizontal accuracy measure (m): 0.1

l. Horizontal Reference Datum Code: 002 North American Datum of 1983

m. Source Map Scale Number:

1.6 Owner or Operator:

a. Name: Newington Energy LLC

b. Phone: (603) 766-1880

Mailing address:

c. Street 1: 200 Shattuck Way **d. Street 2:**

e. City: Newington **f. State:** NH **g. Zip:** 03801 -

1.7 Name and title of person or position responsible for part 68 (RMP) implementation:

a. Name of person: Argyros, David

b. Title of person or position: EH&S Manager

c. Email address: david argyros@ge.com

1.8 Emergency contact:

a. Name: Argyros, David

b. Title: EH&S Manager

c. Phone: (603) 766-1880

d. 24-hour phone: (603) 531-9779

e. Ext. or PIN: 109

f. Email address: david argyros@ge com

1.9 Other points of contact:

a. Facility or Parent Company E-Mail Address:

b. Facility Public Contact Phone:

c. Facility or Parent Company WWW Homepage Address:

1.10 LEPC: Newington LEPC

1.11 Number of full time employees on site: 24

1.12 Covered by:

a. OSHA PSM: Yes

b. EPCRA 302: Yes

c. CAA Title V: Yes **Air operating permit ID:** TP-B-0526

1.13 OSHA Star or Merit Ranking: No

1.14 Last Safety Inspection (by an External Agency) Date: 08/15/2007

1.15 Last Safety Inspection Performed by an External Agency: EPA

1.16 Will this RMP involve predictive filing?: No

1.18 RMP Preparer Information:

a. Name:

b. Telephone:

c. Street1:

d. Street2:

e. City:

f. State: g. ZIP: -

Section 1.17 Process(es)

a. Process ID: 1 Program Level 3 NH3 for NOx Reduction

b. NAICS Code

22111 Electric Power Generation

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
1 Ammonia (anhydrous)	7664-41-7	19 992

Section 2. Toxics: Worst Case

Toxics: Worst Case ID 1

2.1 a. Chemical Name: Ammonia (anhydrous)

b. Percent Weight of Chemical (if in a mixture): 100 0

2.2 Physical State: Gas Liquified by Pressure

2.3 Model used: EPA's RMP*Comp(TM)

2.4 Scenario: Liquid spill & Vaporization

2.5 Quantity released: 16 900 lbs

2.6 Release rate: 1,690 0 lbs/min

2.7 Release duration: 10 0 mins

2.8 Wind speed: 1 5 m/sec

2.9 Atmospheric Stability Class: F

2.10 Topography: Urban

2.11 Distance to Endpoint: 1.20 mi

2.12 Estimated Residential population within distance to endpoint: 2 400

2.13 Public receptors within distance to endpoint:

a. Schools:	No	d. Prisons/Correction facilities:	No
b. Residences:	Yes	e. Recreation areas:	Yes
c. Hospitals:	No	f. Major commercial, office or, industrial areas:	Yes

g. Other (Specify):

2.14 Environmental receptors within distance to endpoint:

a. National or state parks, forests, or monuments: Yes

b. Officially designated wildlife sanctuaries, preserves, or refuges: No

c. Federal wilderness areas: No

d. Other (Specify):

2.15 Passive mitigation considered:

a. Dikes:	Yes	d. Drains:	No
b. Enclosures:	No	e. Sumps:	Yes
c. Berms:	No	f. Other (Specify):	

2.16 Graphic file name:

Section 3. Toxics: Alternative Release

Toxics: Alternative Release ID: 1

3.1 a. Chemical Name: Ammonia (anhydrous)

b. Percent Weight of Chemical (if in a mixture): 100.0

3.2 Physical State: Gas Liquified by Pressure

3.3 Model: EPA's RMP*Comp(TM)

3.4 Scenario: Pipe leak

3.5 Quantity released: 300 lbs

3.6 Release rate: 300.0 lbs/min

3.7 Release duration: 1.0 mins

3.8 Wind speed: 3.0 m/sec

3.9 Atmospheric Stability Class: D

3.10 Topography: Urban

3.11 Distance to Endpoint: 0.10 mi

3.12 Estimated Residential population within distance to endpoint: 0

3.13 Public receptors within distance to endpoint:

a. Schools:	No	d. Prisons/Correction facilities:	No
b. Residences:	Yes	e. Recreation areas:	Yes
c. Hospitals:	No	f. Major commercial, office, or industrial areas:	Yes

g. Other (Specify):

3.14 Environmental receptors within distance to endpoint:

a. National or state parks, forests, or monuments: Yes

b. Officially designated wildlife sanctuaries, preserves, or refuges: No

c. Federal wilderness areas: No

d. Other (Specify):

3.15 Passive mitigation considered:

a. Dikes:	Yes	d. Drains:	Yes
b. Enclosures:	No	e. Sumps:	Yes
c. Berms:	No	f. Other (Specify):	

3.16 Active mitigation considered:

a. Sprinkler systems:	No	f. Flares:	No
b. Deluge system:	Yes	g. Scrubbers:	No
c. Water curtain:	No	h. Emergency shutdown systems:	Yes
d. Neutralization:	No	i. Other (Specify):	
e. Excess flow valve:	Yes		

3.17 Graphic file name:

Section 4. Flammables: Worst Case --- No Data To Report

Section 5. Flammables: Alternative Release --- No Data To Report

Section 6. Accident History --- No Data To Report

Section 7. Prevention Program 3

Process ID: 1 NH3 for NOx Reduction

Prevention Program ID: 1

Prevention Program Description: Ammonia Storage Vessel

Anhydrous ammonia is supplied by tanker truck through a liquid filled connection. This connection is supported by a bulkhead containment wall designed to withstand the force arising from a tanker truck pulling away while still connected. An emergency shut-off valve is also provided at both the liquid filled and vapor returned line to allow quick shut-off of liquid and vapor flow in the event that there is an accidental pull-away of a truck or a hose rupture. Ammonia is stored in a liquid state in equilibrium with its vapor at saturation conditions in a pressurized vessel. The vessel is maintained at approximately 100 psig and 64 °F by an electric vaporizer under drum pressure control via a PID loop controller (1CI-PIC-1570) modulating the heat input to the ammonia vaporizer.

The ammonia storage vessel temperature is monitored through the local indicator (1CI-TI-1570). The level in the vessel is monitored through the local gauge (1CI-LI-1571), and remotely through the DCS (1CI-LI-1570). A local level indicator (1CI-LI-1570A) and a local horn for high level alarm (1CI-LAH-1570) are also provided at the truck unloading station. The ammonia tank pressure is indicated through a local gauge (1CI-PI-1571) and remotely through the DCS (1CI-PI-1570). A high pressure switch (1CI-PSH-1572) will shut-off the vaporizer if the drum pressure increases to 165 psig. The tank is supplied with a dual pressure relief valve set at

265 psig; excess flow valves at all fluid flow nozzles; and thermal relief valves set at 325 to 350 psig on associated liquid ammonia lines

4.1 2□Ammonia Vaporizer

The ammonia vessel is kept at the desired operating pressure of 100 psig by an electric vaporizer via a PID loop pressure controller (1CI-PIC-1570) Liquid anhydrous ammonia is vaporized by direct contact with the heating element The liquid ammonia feed line to the vaporizer is protected from over pressure at blocked in condition by a thermal relief valve (1CI-PSV-1582) set at 350 psig. The gasified ammonia is piped back via the vapor line into the storage vessel. The vapor from the vessel is then sent to the dilution air system. A pressure controller (1CI-PC-1573) set at 52 psig is provided on the vapor line to ensure a constant feed pressure to the dilution air system. A high temperature cut-off switch (1CI-TSH-1571) is provided to shut-down the vaporizer if the heating element is in excess of 200 °F

4 1 3□Ammonia Dilution Air and Injection Control Skid

A dilution air and injection control skid is supplied for the HRSG in the plant to support the operation of the associated SCR system. The skid consists of 100%-spare Dilution Air Blowers (1CI-BLR-1001A/B), Dilution Air Heaters (1CI-HTR-1001A/B) Ammonia/Air Mixer (1CI-MIX-1001), Ammonia Filter (1CI-FLT-1001) and Ammonia Accumulator (1CI-ACC-1001)

Ammonia vapor is fed from the storage vessel to the dilution air and injection control skid under constant pressure control (1CI-PC-1573) set at 52 psig The ammonia injection rate is regulated via a corresponding flow valve (1CI-FV-1600) under its respective flow controller (1CI-FC-1600). The controller is reset by a function block (1CI-FY-1600) that automatically calculates the required ammonia injection rate to achieve the required NOx reduction depending on the GTG load and fuel type; and the firing load of the HRSG duct burner. The function block (1CI-FF-1601) receives the GTG exhaust gas inlet NOx concentration signal (1GT-AI-1000) to the SCR catalyst reactor from the GTG Controller Mark V. This function block also receives a calculated inlet NOx signal for the duct burner from the DCS via 1FG-FI-1802, 1CI-AY-1535 and 1CI-AI-1535. The signal from 1CI-FF-1601 is sent to 1CI-FY-1600 and acted as a feedforward signal to rapidly adjusts the ammonia flow valve to follow load swing The ammonia flow is trimmed via a feedback signal (1CI-FF-1600. 1HR-AI-1513 & 1HR-AI-1533) form the outlet NOx analyzers (1HR-AIT-1513) located at the stack. Depending on the GTG fuel type, the NOx outlet analyzer indicator in the DCS is 1HR-AI-1513 for GTG firing with fuel oil and 1HR-AI-1533 for GTG firing with fuel gas The combined feedforward and feedback signal is used to stimulate a faster response to modulate the ammonia flow valve (1CI-FV-1600) and thus allows rapid achievement of the specified outlet NOx without any overshoots and undershoots and large deviations from the setpoint A hand control station in the DCS (1CI-HS-1600) is provided for the operator to switch between the GTG firing mode This sets the appropriate constants for the base ammonia flow demand and trim calculations.
The regulated ammonia flow is diluted in transport air in an Ammonia/Air Mixer (1CI-MIX-1001) before injection into the SCR catalyst reactor via an injection/balancing skid of the HRSG. Ammonia Filter (1CI-FLT-1001) and Ammonia Accumulator (1CI-ACC-1001) to knock out any condensate is provided for the ammonia vapor just before the mixer.

The ammonia dilution air and injection control skid is supplied with a 100%-spare ammonia Dilution Air Blowers (1CI-BLR-1001A/B) Each blower is provided with an inlet filter/silencer unit. The air flowrate is measured by 1CI-FT-1602 and monitored in the DCS via 1CI-FI-1602 The air is heated in a Dilution Air Heater (1CI-HTR-1001A/B) prior to

mixing with ammonia in the ammonia/air mixer. The air temperature outlet of the heater is 225 °F and is monitored in the DCS (1CI-TI-1600) The heater is controlled in the range of 200 °F to 250°F by temperature switch (1CI-TSL-1601 1CI-TSH-1601). A local high temperature switch (1CI-TSH-1603A/B) is also provided to shut-off heater at TBD °F

The ammonia injection control is activated automatically by a minimum condition permissive (1CI-TY-1503) on the temperature at the SCR catalyst reactor inlet The system also needs to meet the following injection permissive conditions: GTG load greater than 90 % (1GT-JL-1006), dilution air temperature (1CI-TI-1601) leaving the dilution air heater greater than 150 °F, dilution air flow greater than 3000 lb/hr and the system on switch (1CI-HS-1601) is enable. The system is automatically shutdown upon tripout of the GTG (1GT-XA-1009), flue gas temperature greater than 800 °F (1CI-TY-1503) and loss of the start permissive conditions specify above In case of failure of the online blower, the standby spare unit is automatically activated through DCS logic. Each blower is provided with running lights (1CI-XL-1622/1623) in the DCS. Each Heater is also provided with a heater on signal (1CI-XL-1623A/B) and heater trouble (1CI-XA-1623A/B) in the DCS

4.2□Start-Up
Ammonia vessel is filled to 82 % of storage volume per code requirement (OSHA 29CFR 1910).

7.1 NAICS Code 22111

7.2 Chemicals **Chemical Name**
Ammonia (anhydrous)

7.3 Date on which the safety information was last reviewed or revised: 12/31/2007

7.4 Process Hazard Analysis (PHA):

a. Date of last PHA or PHA update: 05/08/2007

b. The technique used:

What If:	No	**Failure Mode and Effects Analysis:**	No
Checklist:	No	**Fault Tree Analysis:**	No
What If/Checklist:	Yes	**Other (Specify):**	
HAZOP:	No		

c. Expected or actual date of completion of all changes from last PHA or PHA update: 12/01/2008

d. Major hazards identified:

Toxic release:	Yes	**Contamination:**	No
Fire:	No	**Equipment failure:**	Yes
Explosion:	No	**Loss of cooling, heating, electricity, instrument air:**	No
Runaway reaction:	No	**Earthquake:**	No
Polymerization:	No	**Floods (flood plain):**	No
Overpressurization:	Yes	**Tornado:**	No
Corrosion:	No	**Hurricanes:**	No

Overfilling: Yes **Other (Specify):**

e. **Process controls in use:**

Vents:	No	**Emergency air supply:**	No
Relief valves:	Yes	**Emergency power:**	Yes
Check valves:	Yes	**Backup pump:**	Yes
Scrubbers:	No	**Grounding equipment:**	No
Flares:	No	**Inhibitor addition:**	No
Manual shutoffs:	Yes	**Rupture disks:**	Yes
Automatic shutoffs:	Yes	**Excess flow device:**	No
Interlocks:	Yes	**Quench system:**	Yes
Alarms and procedures:	Yes	**Purge system:**	No
Keyed bypass:	No	**None:**	No
		Other (Specify):	

f. **Mitigation systems in use:**

Sprinkler system:	No	**Water curtain:**	No
Dikes:	Yes	**Enclosure:**	No
Fire walls:	No	**Neutralization:**	No
Blast walls:	No	**None:**	No
Deluge system:	Yes	**Other (Specify):**	

g. **Monitoring/detection systems in use:**

Process area detectors:	No	**None:**	No
Perimeter monitors:	No	**Other (Specify):**	handheld direct reading instruments and colormetric detector tubes

h. **Changes since last PHA or PHA update:**

Reduction in chemical inventory:	No	**Installation of perimeter monitoring systems:**	No
Increase in chemical inventory:	No	**Installation of mitigation systems:**	No
Change process parameters:	No	**None recommended:**	No
Installation of process controls:	No	**None:**	Yes
Installation of process detection systems:	No	**Other (Specify):**	

7.5 Date of most recent review or revision of operating procedures: 10/31/2007

7.6 Training:

a. **The date of the most recent review or revision of training programs:** 05/08/2007

b. **The type of training provided:**

Classroom: Yes **On the job:** Yes **Other (Specify):**

c. The type of competency testing used:

Written test:	Yes	**Observation:**	Yes
Oral test:	No	**Other (Specify):**	
Demonstration:	No		

7.7 Maintenance:

a. The date of the most recent review or revision of maintenance procedures: 10/31/2007

b. The date of the most recent equipment inspection or test: 02/01/2008

c. Equipment most recently inspected or tested : Valves, gauges, tanks, deluge system, vaporizer heaters blowers, controls, and alarms

7.8 Management of change:

a. The date of the most recent change that triggered management of change procedures:

b. The date of the most recent review or revision of management of change procedures: 05/08/2007

7.9 The date of the most recent pre-startup review:

7.10 Compliance audits:

a. The date of the most recent compliance audit:

b. Expected date of completion of all changes resulting from the compliance audit:

7.11 Incident investigation:

a. The date of the most recent incident investigation (if any):

b. Expected or actual date of completion of all changes resulting from the investigation:

7.12 The date of the most recent review or revision of employee participation plans: 05/08/2007

7.13 The date of the most recent review or revision of hot work permit procedures: 05/08/2007

7.14 The date of the most recent review or revision of contractor safety procedures:

7.15 The date of the most recent evaluation of contractor safety performance:

Section 8. Prevention Program 2 --- No Data To Report

Section 9. Emergency Response

9.1 Written Emergency Response (ER) Plan:

a. Is facility included in written community emergency response plan? No

b. Does facility have its own written emergency response plan? Yes

9.2 Does facility's ER plan include specific actions to be taken in response to accidental releases of regulated substance(s)? Yes

9.3 Does facility's ER plan include procedures for informing the public and local agencies responding to accidental releases?	Yes
9.4 Does facility's ER plan include information on emergency heath care?	Yes
9.5 Date of most recent review or update of facility's ER plan:	12/31/2007
9.6 Date of most recent ER training for facility's employees:	06/12/2007

9.7 Local agency with which facility's ER plan or response activities are coordinated:

a. **Name of agency:** Newington Fire Dept (LEPC)

b. **Telephone number:** (603) 436-9441

9.8 Subject to:

a. **OSHA Regulations at 29 CFR 1910.38:**	Yes
b. **OSHA Regulations at 29 CFR 1910.120:**	Yes
c. **Clean Water Act Regulations at 40 CFR 112:**	Yes
d. **RCRA Regulations at 40 CFR 264, 265, and 279.52:**	Yes
e. **OPA-90 Regulations at 40 CFR 112, 33 CFR 154, 49 CFR 194, or 30 CFR 254:**	Yes
f. **State EPCRA Rules/Law:**	No
g. **Other (Specify):**	

Executive Summary

Executive Summary
Newington Energy - Newington, NH

The Newington Energy Power Project (NEL) is a 525 MW gas fired combined cycle power plant located at 99 Old Dover Road in Newington, NH The project lies approximately 1000 feet from the Piscataqua River in a mixed zone area The NEL Facility is to be owned and operated as a merchant power facility using state-of-the-art technology and environmental controls that provide extremely high operational efficiency and low air emissions Through the use of natural gas and low sulfur number 2 distillate, as a backup fuel the facility will generate enough power to supply of 700,000 homes in New England

System Overview

The anhydrous ammonia system provides storage, vaporization, transfer, and injection control facilities for the ammonia gas to support the selective catalytic reduction system (SCR) in the heat recovery steam generator (HRSG). The application of Selective Catalytic NOx Reduction Technology (the process) reduces nitrogen oxide air emissions from the station There are two HRSG's in the plant and are designated as train 1 and 2. Each HRSG will have its own dedicated anhydrous ammonia system and the system description below pertains to the train 1 design and operation The train 2 system design and operation will be identical to train 1

The ammonia system consists of a pressurized storage vessel supplied with a 100% directly heated vaporizer, one ammonia dilution air and injection control skid for the HRSG(s) which includes two-100% dilution air blowers and heaters; ammonia/air mixer and the associated injection/balancing skid of the HRSG The SCR is used to reduce the emissions level of nitrogen oxides (NOx) generated from the operation of the gas turbine generator (GTG), and of the duct burners in the HRSG Ammonia is injected into the exhaust gas stream at the proper temperature section in the HRSG that contain the SCR catalyst modules and converts the NOx into nitrogen and water before discharge of the exhaust gas to the atmosphere via the stack

The ammonia storage and supply system includes a 2,000-gallon horizontal, cylindrical, pressure vessel for storing liquefied anhydrous ammonia The storage vessel is size to provide approximately 2 5 days of continuous supply of ammonia at the design usage rate of 144 lb/hr for NOx reduction to 9 ppmv based on a 24-hour per day operation of fuel oil at -10°F in the GTG When the GTG is firing with fuel gas the vessel has approximately 7 days of storage. The vessel is mechanically rated for 265 psig and 170 °F

Anhydrous ammonia is supplied by tanker truck through a liquid filled connection This connection is supported by a bulkhead containment wall designed to withstand the force arising from a tanker truck pulling away while still connected An emergency shut-off valve is also provided at both the liquid filled and vapor returned line to allow quick shut-off of liquid and vapor flow in the event that there is an accidental pull-away of a truck or a hose rupture. Ammonia is stored in a liquid state in equilibrium with its vapor at saturation conditions in a pressurized vessel The vessel is maintained at approximately 100 psig and 64 °F by an electric vaporizer under drum pressure control via a PID loop controller modulating the heat input to the ammonia vaporizer

Ammonia Storage Vessel

The ammonia storage vessel temperature is monitored through the local indicator The level in the vessel is monitored through the local gauge, and remotely through the DCS. A local level indicator and a local horn for high level alarm are also provided at the truck unloading station The ammonia tank pressure is indicated through a local gauge and remotely through the DCS . A high pressure switch will shut-off the vaporizer if the drum pressure increases to 165 psig The tank is supplied with a dual pressure relief valve set at 265 psig; excess flow valves at all fluid flow nozzles; and thermal relief valves set at 325 to 350 psig on associated liquid ammonia lines

Ammonia Vaporizer

The ammonia vessel is kept at the desired operating pressure of 100 psig by an electric vaporizer via a PID loop pressure controller Liquid anhydrous ammonia is vaporized by direct contact with the heating element The liquid ammonia feed line to the vaporizer is protected from over pressure at blocked in condition by a thermal relief valve set at 350 psig. The gasified ammonia is piped back via the vapor line into the storage vessel The vapor from the vessel is then sent to the dilution air system. A pressure controller set at 52 psig is provided on the vapor line to ensure a constant feed pressure to the dilution air system. A high temperature cut-off switch is provided to shut-down the vaporizer if the heating element is in excess of 200 °F

Ammonia Dilution Air and Injection Control Skid

A dilution air and injection control skid is supplied for the HRSG in the plant to support the operation of the associated SCR system The skid consists of 100%-spare Dilution Air Blowers, Dilution Air Heaters, Ammonia/Air Mixer, Ammonia Filter (1CI-FLT-1001) and Ammonia Accumulator

Ammonia vapor is fed from the storage vessel to the dilution air and injection control skid under constant pressure control set at 52 psig. The ammonia injection rate is regulated via a corresponding flow valve under its respective flow controller The controller is reset by a function block that automatically calculates the required ammonia injection rate to achieve the required NOx reduction depending on the GTG load and fuel type; and the firing load of the HRSG duct burner The function block receives the GTG exhaust gas inlet NOx concentration signal to the SCR catalyst reactor from the GTG Controller Mark V This function block also receives a calculated inlet NOx signal for the duct burner from the DCS via. The signal from is sent and acted as a feedforward signal to rapidly adjusts the ammonia flow valve to follow load swing The ammonia flow is trimmed via a feedback signal form the outlet NOx analyzers located at the stack Depending on the GTG fuel type, the NOx outlet analyzer indicator in the DCS is for GTG firing with fuel oil and for GTG firing with fuel gas. The combined feedforward and feedback signal is used to stimulate a faster response to modulate the ammonia flow valve and thus allows rapid achievement of the specified outlet NOx without any overshoots and undershoots and large deviations from the setpoint. A hand control station in the DCS is provided for the operator to switch between the GTG firing mode. This sets the appropriate constants for the base ammonia flow demand and trim calculations
The regulated ammonia flow is diluted in transport air in an Ammonia/Air Mixer injection into the SCR catalyst reactor via an injection/balancing skid of the HRSG. Ammonia Filter (1CI-FLT-1001) and Ammonia Accumulator to knock out any condensate is provided for the ammonia vapor just before the mixer

The ammonia dilution air and injection control skid is supplied with a 100%-spare ammonia Dilution Air Blowers Each blower is provided with an inlet filter/silencer unit. The air flowrate is measured by and monitored in the DCS via. The air is heated in a Dilution Air Heater prior to mixing with ammonia in the ammonia/air mixer The air temperature outlet of the heater is 225 °F and is monitored in the DCS. The heater is controlled in the range of 200 °F to 250°F by temperature switch A local high temperature switch (1CI-TSH-1603A/B) is also provided

to shut-off heater at TBD °F.

The ammonia injection control is activated automatically by a minimum condition permissive on the temperature at the SCR catalyst reactor inlet. The system also needs to meet the following injection permissive conditions: GTG load greater than 90 %, dilution air temperature leaving the dilution air heater greater than 150 °F, dilution air flow greater than 3000 lb/hr and the system on switch is enable. The system is automatically shutdown upon tripout of the GTG, flue gas temperature greater than 800 °F and loss of the start permissive conditions specify above. In case of failure of the online blower, the standby spare unit is automatically activated through DCS logic Each blower is provided with running lights in the DCS Each Heater is also provided with a heater on signal and heater trouble in the DCS.

Risk Management Plan (RMP) and Process Safety Management (PSM)

GE Contractual Services recognizes that people are its most vital resource and their safety and health is one of our principal responsibilities. GE Contractual Services will strive to provide a safe and healthy working environment and to avoid adverse impact and injury to the environment and the communities in which we do business. GE utilizes a Risk Management Plan (RMP) and Process Safety Management (PSM) to provide guidelines for preventing and/or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals In general terms, the RMP protects the health and safety of environment and the community and PSM protects the on-site employees

Items that are addressed in the RMP/PSM:

An Emergency Response Plan (the Integrated Contingency Plan (ICP)) has been developed to address a broad spectrum of emergency scenarios and contingent responses The use of a single emergency response plan per facility will eliminate confusion for facility first responders who often must decide which of their plans is applicable to a particular emergency The "ICP" is designed to yield a highly functional document for use in varied emergency situations while providing a mechanism for complying with multiple agency requirements Use of a single integrated contingency plan should also improve coordination between facility response personnel and local state, and federal emergency response personnel
Offsite Consequence Analysis of worst case and an alternative case release scenarios where air dispersion models and release parameters are evaluated to determine off-site impacts and affected populations Records of these analyzes are kept

A management system is in place to implement and manage the RMP/PSM procedures. The qualified person is responsible for coordinating with and keeping local authorities informed of changes that affect the RMP/PSM

The Process Safety Management program provides a safe and healthful work environment for the facility employees/contractors by performing a process hazard analysis. A process hazard analysis is an organized and systematic effort to identify and analyze the significance of potential hazards associated with the processing or handling of highly hazardous chemicals

Operating Procedures are established for all affected processes, relating to tasks to be performed data to be recorded, operating conditions maintained, samples to be collected, and safety and health precautions to be taken for each particular process

Employees are trained to understand the nature and causes of the problems created by process operations and increase employee awareness and reactions to the hazards of each process Training also includes O&M procedures health and safety, emergency operations and safe work practices. Refresher training must be provided at least every two years.

Mechanical Integrity has been developed to assure the continued integrity of process equipment The program includes the identification of all equipment and instrumentation, written maintenance procedures, documentation of maintenance training and documentation of inspections and testing

An incident Investigation has been developed to investigate incidents that occur in the facility including written investigations procedures

Compliance Audits of the facility PSM/RMP program are evaluated at least every three years and must include auditing maintenance records for the previous two years

The Contractor Safety Program ensures that contractors hired to work in and around processes that involve highly hazardous chemicals have been screened by reviewing their safety performance records Contractor selection criteria includes, which contractor can complete the specialized work without endangering the safety

and health of employees at the plant. Written procedures have been developed that also include training for contractors

Pre-Startup Safety Review and Procedures are conducted as part of the "normal startup" operating procedure for each system. Written procedures for conducting a pre-startup safety review have been developed and personnel have been trained in their use

Non-Routine work authorization procedures are in place and reference and coordinate, as applicable, with lockout/tagout procedures line breaking procedures, confined space entry procedures, and hot work permits

The Management of Change Program monitors and controls all modifications to equipment, procedures raw materials and processing conditions

Employees are encouraged and required to participate in the RMP/PSM process Their input is of critical importance and is required by regulation and employees have access to information developed under the RMP/PSM Program

Employee's are trained to understand the safety and health hazards of the chemicals and processes in their work area that involve highly hazardous chemicals Additional training in operating procedures, safe work practices, emergency response and evacuation, and other areas pertinent to process safety and health are covered in the facility's training program Records of training are maintained

The RMP program requires audits of certain program elements every 3 years The PSM program requires audits of certain program elements every 2 years.

RMP Validation Errors/Warnings --- No Data To Report

Appendix C

Hazards of the Regulated Substances

MSDS (Anhydrous Ammonia)
Compressed Gas Assoc. Table 6-1 Physical Properties
Compressed Gas Table 6-2 Properties Liquid Ammonia
Compressed Gas Assoc. Table 9-1 Toxicity

MATERIAL SAFETY DATA SHEET

ANHYDROUS AMMONIA

DISTRIBUTORS:
TANNER INDUSTRIES, INC.

DIVISIONS:

NATIONAL AMMONIA	NORTHEASTERN AMMONIA
HAMLER INDUSTRIES	BOWER AMMONIA & CHEMICAL

735 Davisville Road, Third Floor, Southampton, PA 18966; 215-322-1238

CORPORATE EMERGENCY TELEPHONE NUMBER: 800-643-6226; CHEMTREC (CMA) 800-424-9300

DESCRIPTION

CHEMICAL NAME: Ammonia, Anhydrous **CAS REGISTRY NO:** 7664-41-7
SYNONYMS: Ammonia
CHEMICAL FAMILY: Ammonia **FORMULA**: NH3 **MOL. WT**: 17.03 (NH3)
COMPOSITION: 99+% Ammonia

STATEMENT OF HEALTH HAZARD

HAZARD DESCRIPTION:
Ammonia is an irritant and corrosive to the skin, eyes, respiratory tract and mucous membranes. May cause severe chemical burns to the eyes, lungs and skin. Skin and respiratory related diseases could be aggravated by exposure.

Not recognized by OSHA as a carcinogen.
Not listed in the National Toxicology Program.
Not listed as a carcinogen by the International Agency for Research on Cancer.

EXPOSURE LIMITS FOR AMMONIA: Vapor

OSHA	50 ppm,	35 mg / m3 PEL	8 hour TWA
NIOSH	35 ppm,	27 mg / m3 STEL	15 minutes
	25 ppm,	18 mg / m3 REL	10 hour TWA
	300 ppm,	IDLH	
ACGIH	25 ppm,	18 mg / m3 TLV	8 hour TWA
	35 ppm,	27 mg / m3 STEL	15 minutes

TOXICITY: LD 50 (Oral / Rat) 350 mg / kg

PHYSICAL DATA

BOILING POINT: -28°F
PH: N/A
VAPOR DENSITY (air = 1): 0.596 at 32°F
SPECIFIC GRAVITY (water = 1): 0.682 at 39°F
PERCENT VOLATILE: 100% at 212°F
APPEARANCE AND ODOR: Colorless liquid or gas with pungent odor.
CRITICAL TEMPERATURE: 270.3°F
APPROXIMATE FREEZING POINT: -108°F
WEIGHT (per gallon): 5.69 pounds at -28°F
VAPOR PRESSURE: 10 atm at 78°F
SOLUBILITY IN WATER: 100%
EVAPORATION RATE (water = 1): Similar
SURFACE TENSION: 23.4 Dynes / cm at 52°F
CRITICAL PRESSURE: 111.5 atm

EMERGENCY TREATMENT

EFFECTS OF OVEREXPOSURE:
Eye: Tearing, edema or blindness may occur.
Skin: Irritation, corrosive burns, blister formation may result. Contact with liquid may produce a caustic burn and frostbite.
Inhalation: Acute exposure may result in severe irritation of the respiratory tract, bronchospasm, pulmonary edema or respiratory arrest.
Ingestion: Lung irritation and pulmonary edema may occur. ***Extreme exposure may result in death from spasm, inflammation or edema. Brief inhalation exposure to 5,000 ppm may be fatal.***
EMERGENCY AID:
Eye: Flush with copious amounts of water for a minimum of 20 minutes. Eyelids should be held apart and away from eyeball for

thorough rinsing.
Skin: Flush with copious amounts of water for a minimum of 20 minutes while removing contaminated clothing and shoes. Do not rub or apply ointment on affected area. Clothing may initially freeze to skin. Ensure clothing is not frozen prior to removal.
Inhalation: Remove to fresh air. Administer oxygen or artificial respiration, if necessary.
Ingestion: If conscious, give large amounts of water to drink. May drink orange juice, citrus juice or diluted vinegar (1:4) to counteract ammonia.

DO NOT INDUCE VOMITING! SEEK IMMEDIATE MEDICAL HELP FOR ALL EXPOSURES!

***NOTE TO PHYSICIAN*: Respiratory injury may appear as a delayed phenomenon. Pulmonary edema may follow chemical bronchitis. Supportive treatment with necessary ventilation actions, including oxygen, may warrant consideration.**

FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT: None
FLAMMABLE LIMITS IN AIR: LEL / UEL 16% to 25%
LEL / UEL listed in the *NIOSH Pocket Guide to Chemical Hazards* as 15% to 28%
AUTO IGNITION TEMPERATURE: 1,204°F (If Catalyzed)
1,570°F (If Uncatalyzed)
EXTINGUISHING MEDIA: Non-Combustible

SPECIAL FIRE-FIGHTING PROCEDURES:
Must wear protective clothing and a positive pressure SCBA. Stop source if possible. Fight fires using dry chemical, carbon dioxide, or alcohol-resistant foam. Cool fire exposed containers with water spray. Stay upwind when containers are threatened. Use water spray to knock down vapor and dilute.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Outdoors, ammonia is not generally a fire hazard. Indoors, in confined areas, ammonia may be a fire hazard, especially if oil and other combustible materials are present. Combustion may form toxic nitrogen oxides.
If relief valves are inoperative, heat exposed storage containers may become explosion hazards.

CHEMICAL REACTIVITY

STABILITY:
Stable at room temperature. Anhydrous Ammonia will react exothermically with acids and water.

CONDITIONS TO AVOID:
Avoid Anhydrous Ammonia contact with chemicals such as hydrocarbons, strong oxidizers, mercury, chlorine, iodine, bromine, silver oxide or hypochlorites; they can form explosive compounds.
Avoid Anhydrous Ammonia contact with chlorine, which forms a chloramine gas, which is a primary skin irritant and sensitizer.
Anhydrous Ammonia has a corrosive reaction with galvanized surfaces, copper, brass, bronze, aluminum alloys, mercury, gold and silver.

HAZARDOUS DECOMPOSITION PRODUCTS:
Anhydrous Ammonia decomposes to hydrogen and nitrogen gases above 450°C (842°F). Decomposition temperatures may be lowered by contact with certain metals.

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN:
Wear respiratory protection and protective clothing; see PROTECTIVE EQUIPMENT. Stop source if possible. Stay upwind and use water spray downwind of container to absorb the evolved gas. Contain spill and runoff from entering drains, sewers, and water systems by utilizing methods such as diking, containment, and absorption. CAUTION: ADDING WATER DIRECTLY TO LIQUID SPILLS WILL INCREASE VOLATILIZATION OF AMMONIA, THUS INCREASING THE POSSIBILITY OF EXPOSURE.

WASTE DISPOSAL:
Listed as hazardous substance under CWA (40 CFR 116.4, 40 CFR 117.3). Reportable Quantity 100 pounds. Classified as hazardous waste under RCRA (40CFR 261.32 Corrosive #D002). Comply with all regulations. Suitably diluted product may be disposed of on agricultural land as fertilizer. Keep spill from entering streams, lakes, or any water systems.

SPECIAL PROTECTION AND PROCEDURES

RESPIRATORY PROTECTION:
MSHA/NIOSH approved respiratory protection that consists of a full-face gas mask and canisters effective for ammonia that enable

use for entry and escape in emergencies. Refer to 29 CFR 1910.134 and ANSI: Z88.2 for requirements and selection. A positive pressure SCBA is required for entry into ammonia atmospheres at or above 300 ppm (IDLH).

VENTILATION:
Local exhaust should be sufficient to keep ammonia vapor to 25 ppm or less.

PROTECTIVE EQUIPMENT:
Splash proof, chemical safety goggles, rubber gloves and boots should be worn to prevent contact. Face shield can be worn over the goggles as additional protection. Respiratory protection and cotton work clothes are recommended. Refer to 29 CFR 1910.132 through 1910.138 for requirements. A positive pressure SCBA is required for entry into ammonia atmospheres at or above 300 ppm (IDLH).

SPECIAL PRECAUTIONS

STORAGE AND HANDLING:
Store in cool (26.7°C / 80°F) and well-ventilated area, with containers tightly closed. OSHA 29 CFR 1910.111 prescribes handling and storage requirements for anhydrous ammonia as a hazardous material.

WORK-PLACE PROTECTIVE EQUIPMENT:
Protective equipment should be stored near, but outside of anhydrous ammonia area. Water for first aid, such as an eyewash station and safety shower, should be kept available in the immediate vicinity. See 29 CFR 1910.111 for workplace requirements.

DISPOSAL:
See WASTE DISPOSAL. Classified as RCRA Hazardous Waste due to corrosivity with designation D002, if disposed of in original form.

LABELING AND SHIPPING

HAZARD CLASS: 2.2 (Non-Flammable Gas) US Domestic AND 2.3 (Poison Gas) International

PROPER SHIPPING DESCRIPTION: Ammonia, Anhydrous, 2.2, UN1005, RQ, Inhalation Hazard (US Domestic) AND Ammonia, Anhydrous, 2.3. UN1005, RQ, Poison-Inhalation Hazard Zone "D" (International)

PLACARD: Non-Flammable Gas (US Domestic) **IDENTIFICATION NO**: UN 1005
AND Poison Gas, Corrosive (Subsidiary) (International)

National Fire Protection Assoc. Hazardous Rating and **Hazardous Materials Identification System Labels**

ANHYDROUS AMMONIA

HEALTH = 3
FLAMMABILITY = 1
REACTIVITY = 0
PERSONAL PROTECTION = H
:

OTHER REGULATORY REQUIREMENTS

Under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), Section 103, any environmental release of this chemical equal to or over the reportable quantity of 100 lbs. must be reported promptly to the National Response Center, Washington, D.C. (1-800-424-8802).

The material is subject to the reporting requirements of Section 304, Section 312 and Section 313, Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372. EPCRA extremely hazardous substance, 40 CFR 355, Title III, Section 302 – Ammonia, TPQ 500 lbs.

EPA Hazard Categories - Immediate: Yes; Delayed: No; Fire: No; Sudden Release: Yes; Reactive: No.

Clean Air Act – Section 112(r): Material is listed under 40 CFR 68.130 (EPA's Risk Management Program) at concentrations amounts greater than 10,000 lbs. (TQ).

DISCLAIMER

The information, data, and recommendations in this material safety data sheet relate only to the specific material designated herein and do not relate to use in combination with any other material or in any process. The information, data, and recommendations set forth herein are believed by us to be accurate. We make no warranties, either expressed or implied, with respect thereto and assume no liability in connection with any use of such information, data, and recommendations.

Revision: May 2001 **Prepared By: JRW**

Table 6-1
Physical properties

	Customary Units	SI Units
Chemical formula	NH_3	NH_3
Molecular weight	17.031	17.031
Boiling Point	-28 °F	-33.3 °C
Critical density	14.7 lb/ft^3	236 kg/m^3
Critical pressure	1657 psia	11.42 MPa
Critical temperature	271.4 °F	133.0 °C
Density of liquid at 70 °F (21.1 °C)	38.00 lb/ft^3	608.7 kg/m^3
Density of vapor at 32 °F (0 °C) and 1 atm	0.0481 lb/ft^3	0.771 kg/m^3
Flammable limits (in air by volume and 1 atm)	16-25%	16-25%
Freezing point at 1 atm	-107.9 °F	-77.72 °C
Heat of solution extrapolated to 0% concentration by weight at 28% concentration by weight	347.4 Btu/lb 214.9 Btu/lb	0.8081 MJ/kg 0.4999 MJ/kg
Ignition temperature (in presence of iron catalyst) (in standard quartz container)	 1204 °F 1562 °F	 651.1 °C 850.0 °C
Latent heat of fusion at -107.9 °F (-77.72 °C)	142.8 Btu/lb	0.3322 MJ/kg
Latent heat of vaporization at boiling point and 1 atm	589.3 Btu/lb	1.371 MJ/kg
Liquid density at -28 °F (-33.3 °C) and 1 atm	42.57 lb/ft^3	681.9 kg/m^3
Solubility in water vol(liq.)/vol(liq.) at 68 °F (15.5 °C)	0.848	0.848
Specific gravity of liquid at -28 °F (-33.3 °C) [water at 39.2 °F (4 °C) = 1]	0.6819	0.6819
Specific gravity of vapor at 32 °F (0 °C) and 1 atm (air = 1)	0.5970	0.5970
Specific heat of vapor at 59 °F (15.0 °C) and 1 atm constant pressure, C_p constant volume, C_v	0.5232 Btu/(lb@ °F) 0.3995 Btu/(lb@ °F)	2.191 kJ/(kg@ °C) 1.673 kJ/(kg@ °C)
Ratio of specific heats (C_p/C_v)	1.3096	1.3096
Specific volume of vapor at 32 °F (0 °C) and 1 atm	20.78 ft^3/lb	1.297 m^3/kg
Vapor density at -28 °F (-33.3 °C) and 1 atm	0.0555 lb/ft^3	0.8890 kg/m^3
Vapor pressure at 70 °F (21.1 °C)	114.1 psig	786.7 kPa
Triple point	-107.86 °F at 0.88 psia	-77.70 °C at 6.1 kPa (abs)
Weight of liquid per gallon at 60 °F (15.5 °C)	5.147 lb/gal	616.8 kg/m^3

Source: *Handbook of Compressed Gases*, pp 231-232, 3rd Edition, 1990 Compressed Gas Association, Inc.

Table 6-2
Properties of liquid ammonia at various temperatures

Temperature		Vapor Pressure		Liquid Density			Specific Gravity of Liquid (Water @ 4°C = 1)	Latent Heat	
°F	°C	psig (1)[a]	kPa	lb/ft³ (2)[a]	lb/gal[c] (3)[a]	kg/m³	(4)[a]	Btu/lb (5)[a]	MJ/kg
-28	-33.3	0.0	0 0	42.57	5 69	681.9	0.682	589 3	1 371
-20	-28 9	3 6	25	42 22	5 64	676 3	0.676	583 6	1 358
-10	-23.3	9 0	62	41.78	5 59	669 3	0.669	576.4	1.341
0	-17 8	15.7	108	41.34	5 53	662 2	0.662	568 9	1.323
10	-12.2	23 8	164	40 89	5 47	655 0	0.655	561.1	1 305
20	-6.7	33 5	231	40.43	5 40	647.6	0.647	553 1	1 287
30	-1.1	45.0	310	39 96	5 34	640 1	0.640	544 8	1 267
40	4 4	58.6	404	39.49	5.28	632.6	0 633	536.2	1 247
50	10.0	74 5	514	39 00	5 21	624 7	0.625	527 3	1 227
60	15 6	92 9	641	38 50	5 15	616.7	0.617	518.1	1 205
65	18 3	103 1	710 8	38.25	5 11	612 7	0 613	513 4	1.194
70	21 1	114 1	786.7	38.00	5 08	608 7	0.609	508 6	1 183
75	23 9	125.8	867.7	37.74	5 05	604.5	0 605	503.7	1 172
80	26 7	138.3	953.5	37 48	5 01	600 4	0 600	498 7	1 160
85	29 4	151.7	1046	37.21	4 97	596 0	0 596	493 6	1 148
90	32 2	165 9	1144	36.95	4 94	591 9	0 592	488.5	1 136
95	35 0	181 1	1249	36 67	4.90	587 4	0 587	483 2	1 124
100	37 8	197 2	1360	36 40	4 87	583.1	0 583	477 8	1 111
105	40 6	214 2	1477	36 12	4 83	578.6	0.579	472 3	1 099
110	43 3	232 3	1602	35 84	4 79	574 1	0.574	466.7	1 085
115	46.1	251.5	1734	35.55	4.75	569 5	0 569	460 9	1 072
120	48.9	271 7	1873	35 26	4 71	564.8	0.565	455.0	1 058
125	51 7	293 1	2021	34.96	4.67	560.0	0 560	448 9	1 044
130	54 4	315.6	2176	34 66	4.63	555.2	0.555	443[b]	1 030
135	57.2	339.4	2340	34 35	4.59	550.2	0.550	436[b]	1.014
140	60.0	364.4	2512	34.04	4.55	545.3	0.545	430[b]	1.000

[a] Data for customary units in columns 1, 2 and 5 are taken from U S. Bureau of Standards Circular No 142, *Tables of Thermodynamic Properties of Ammonia.* 1 April 16, 1923 Values in columns 3 and 4 are calculated from those in column 2 Converted values for metric units are rounded.
[b] Values were calculated from empirical equations given in U S Bureau of Standards Scientific Papers Nos 313 and 315 and represent values obtained by ext beyond the range covered in the experimental work
[c] U S Gallon = 231 cubic inches
Note: Referenced documents are no longer published.

9.3 Physiological effects

9.3.1 Persons having chronic respiratory disease or persons who have shown evidence of undue sensitivity to ammonia should not be employed where they will be exposed to ammonia.

9.3.2 Table 9-1 indicates human physiological response to various concentrations of ammonia in air.

9.3.3 In accordance with DOL regulations as set forth in 29 CFR 1910.1000 [9], an employee's exposure to ammonia shall not exceed an 8-hour time weighted average concentration limit of 50 ppm (35 mg/m^3) in contaminated air by volume during any 8-hour work shift of a 40-hour work week. Concentrations in the range of 20-50 ppm are readily detectable and it is therefore unlikely that any individual would become overexposed unknowingly.

Table 9-1
Human physiological response to various concentrations of ammonia in air

RESPONSE	*CONCENTRATIONS (ppm)*
First perceptible odor[1]	equal to or greater than 5
Immediate throat irritation[2]	equal to or greater than 400
Eye irritation[2]	equal to or greater than 700
Coughing[2]	equal to or greater than 1700
Life threatening for short exposure (0.5 hr)[2]	2500-6500
Rapidly fatal for short exposure (0.5 hr)[2]	5000-10 000

[1] Guide for Short Term Exposure of the Public to Air Pollutants IV: Guide for Ammonia. Committee on Toxicology of the National Academy of Sciences -- National Research Council. November 1972. Environmental Protection Agency. Washington, DC page 3

[2] Ammonia, by the Subcommittee on Ammonia, Committee on Medical and Biological Effects of Environmental Pollutants of the National Research Council Copyright 1979 by University Park Press, Baltimore, MD.

NOTE: Concentrations are for ammonia in air by volume. Exposure levels which are tolerated by some persons may produce coughing and bronchospasm in others. See 9.3.1.

9.4 Controlling Leaks

9.4.1 Leak Detection

9.4.1.1 Odor and Test Paper. A leak in an ammonia system can be detected by odor. The location of a leak may be determined by using moist red litmus paper or moist filter paper impregnated with phenolphthalein. These chemical test papers change color in ammonia vapor.

9.4.1.2 Instruments. Electronic instrumentation is available to detect an ammonia leak and activate an alarm. Detectors can be placed in strategic locations at the facility to monitor the air so corrective action can be taken in the event of a leak.

9.4.2 Action if a leak occurs

9.4.2.1 Only personnel trained for and designated to handle emergencies should attempt

Appendix D

Process Hazard Analysis (PHA) Report

Process Hazard Analysis Report
SCR Anhydrous Ammonia Storage and Injection System

General Electric Contractual Services
Newington Energy
200 Shattuck Way
Newington, New Hampshire

December 2007

Ref. No. 102692 R01

Prepared for:

General Electric Contractual Services
Newington Energy
200 Shattuck Way
Newington, NH 03801

Prepared by:

TRITON ENVIRONMENTAL, INC.
Environmental Consulting & Engineering

385 Church Street, Suite 201, Guilford, Connecticut 06437 • Phone 203.458.7200 Fax: 203.458.7201

TABLE OF CONTENTS

APPENDICES

Special Note: Portions of the text included in this report were reproduced, with permission from Newington Energy, from a report prepared by LGA Engineering, SCR Anhydrous Ammonia Storage and Injection System, Initial Process Hazard Analysis, PHA Team Report, May 21, 2002, Prepared for Newington Energy.

1.0 - INTRODUCTION

Newington Energy, LLC owns a 525 MW dual-fuel (natural gas and oil), combined-cycle power plant at 200 Shattuck Way in Newington, New Hampshire. The plant, designed and constructed by Duke/Fluor Daniel, is located in an industrial zone, where adjacent properties activities include oil terminal operations, light manufacturing and commercial fishing docks. The plant was commissioned for commercial power production in the summer of 2002 and is currently being operated and maintained by General Electric Contractual Services (GECS).

The facility is configured with two trains each comprised of 160 MW single shaft combustion turbine generator set and heat recovery steam generator (HRSG). Steam from both HRSGs is fed to a single 205 MW steam turbine powered generator. The plant is primarily fueled by natural gas delivered by the Maritimes & Northeast Pipeline, LLC. In addition to this fuel, the plant is permitted to burn No. 2 fuel oil for limited periods. Supply of the No. 2 fuel oil is typically delivered to the plant via a pipe line connection from an adjacent terminal, however the plant can also receive fuel from truck deliveries.

The plant manages the nitrogen oxide emissions with selective catalytic reduction (SCR) systems using anhydrous ammonia as the reagent. The ammonia is stored in two (2) 2,000-gallon tanks as a pressurized liquid, one (1) tank for each of the HRSG units. The plant typically stores approximately 13,500 pounds (i.e. greater than 10,000 pounds) of anhydrous ammonia. Because of the amount stored, the plant is required to comply with EPA's RMP rules (Risk Management Program, 40 CFR 68) and OSHA's PSM rules (Process Safety Management, 29 CFR 1910.119).

The ammonia storage facilities at the plant consist of two (2) 2,000-gallon storage tanks located in a common concrete impoundment basin. Tanker trucks deliver anhydrous ammonia to the facility at the truck off-loading area. The area is equipped with vapor and liquid receiving connections that are located adjacent to the impoundment basin.

During power production, a continuous stream of ammonia vapor is withdrawn from the vapor space of each tank for use in the SCR process. The pressure in the storage tanks is maintained by vaporizing liquid ammonia in electrically heated vaporizers mounted below the tanks. The vaporized ammonia is then returned to the tank vapor spaces. The gaseous ammonia

flows from each tank to separate injection skids, each of which is designated to one of the HRSG units. At this location, the gaseous ammonia is mixed with a low-pressure air stream to provide increased flow volume and to facilitate mixing. As the air/ammonia is mixed, it is divided into multiple streams for injection into and mixed with the combustion turbine exhaust gases upstream of the SCR catalyst bed.

The power plant has a minimum of two (2) operators in attendance on-site at all times. These operators are responsible for monitoring the operation of all plant equipment using the distributed control system (DCS), closed circuit television (CCTV), and direct observation during rounds. The ammonia facilities are visually inspected by the outside operator at least once per 12-hour shift and CCTV provides a visual of the tank and delivery areas in the control room.

The OSHA PSM rules requires performance of an "updated process hazard analysis" every five (5) years in accordance with 29 CFR 1910.119(e)(6). The corresponding EPA requirement is found at 40 CFR 68.67, which references the OSHA requirement for updates. The analysis should "be appropriate to the complexity of the process and shall identify, evaluate, and control the hazards involved in the process." Triton has prepared this report and associated appendices to document the completion of the updated PHA.

2.0 - SUMMARY

On May 8, 2007, a PHA team formed by GECS met at the plant in Newington, New Hampshire. Triton provided a presentation to the team regarding the requirements and procedures for the PHA, as provided in Appendix A. The team then used a "what if/checklist" method in their review of equipment, operations and procedures. Table 1, included in Appendix B of this report, was used to provide guidance to approach the analysis of the entire anhydrous ammonia system from receipt, storage and use. The team reviewed the 19 recommendations that were developed during the 2002 "initial" PHA. A total of eight (8) recommendations were developed during the 2007 PHA including several remaining from the initial PHA recommendation items. The status of the initial PHA recommendations has been summarized in Table 2, while Table 3 provides a summary of the 2007 PHA recommendations.

The team concluded that the established operating procedures, controls, and training developed for the subject process result in a low level of risk from hazards associated with the use of anhydrous ammonia at the Newington Energy facility.

3.0 - APPROACH

The PHA review that occurred on May 8, 2007 consisted of three (3) parts: a tour of the anhydrous ammonia system, presentation on the federal requirements associated with the storage and use of a hazardous chemical, and the round table discussion associated with the PHA "what-if/checklist" method. The tour consisted of a review of the system process, as well as the system and storage location relative to surrounding on-site and off-site operations. Upon completion of the tour, Triton Environmental, Inc. (Triton) presented background information on the federal requirements associated with the storage and use of a hazardous chemical and the requirements and procedures for completing a PHA. Following the presentation, a group discussion occurred with eleven (11) Newington Energy/GECS employees regarding general concerns associated with anhydrous ammonia.

Following the presentation, the core PHA team consisting of five (5) members, convened to review the process using the what-if/checklist method. The team members included the following:

- David Argyros, GE Newington Energy, EH&S Manager;
- Chad Harrison, GE Newington Energy, Plant Operator;
- Thomas Fallon, GE Newington Energy, Plant Operator;
- Beth Jennings, Triton, Consultant; and
- Paul Simonetta, Trition, Consultant.

Further information about the experience and background of the team members provided in Table 4 of Appendix B, Team Participants. The team discussed the current material handling, operations, systems and equipment associated with anhydrous ammonia at the Newington, New Hampshire plant. The team considered each plant operation in a round table discussion format. The discussions covered previous recommendations, implementation/change of equipment, reliability/redundancy of current system, and safety associated with operations and maintenance.

The "What-if/Checklist" method used in the PHA is one of several methods that OSHA and EPA recommend. This technique is effective in reviewing and commenting on the various types of accidents that can occur within the process. By using a combination of checklists and procedures, the team can identify potential weaknesses in the system and/or human operations. Once a potential issue is identified, the team can consider techniques, procedures or equipment that may be employed to eliminate the potential weakness. During the meeting, the team

discussed the equipment and procedures involved in the operation and maintenance of the SCR ammonia storage and injection system. Newington Energy personnel indicated that the subject process was not significantly modified since the original PHA completed in 2002. The checklist in Table 1 and the previous recommendations located in Table 2 (see Appendix B) were used as guidance during the discussions.

The team used P&IDs, block flow diagrams, equipment specifications, drawings, and materials of construction to evaluate system equipment and potential hazards. It was noted that most drawings and project documents are available to plant personnel through the Newington Energy computer system. Operating procedures were available for reference during discussion of the associated hazards. Copies were noted to be located in the control room.

The discussions included three (3) main areas that could be considered potential points of failure. These areas were identified as: the truck unloading area and operations, storage of anhydrous ammonia, and the transfer lines to the SCR. From these discussions, eight (8) recommendations/action items were identified. Three (3) of these items were from the initial 2002 PHA. These items are summarized in Table 3, Final PHA Recommendations.

4.0 - TRUCK UNLOADING OPERATIONS

The current anhydrous ammonia vendor typically delivers approximately 6,800 gallons (35,000 pounds) of liquid anhydrous ammonia. The delivery of ammonia is by tanker truck that enters the facility through the main gate at the southeast entrance of the site. Once through the gate, the tanker truck proceeds along the plant road on the west side of the cooling tower to the ammonia tank loading area located at the northeast corner of the site. Upon completing the unloading process, the tanker truck leaves the facility by proceeding (counter clockwise) around the perimeter road and exiting back through the main gate that was used to enter the plant.

The frequency of ammonia deliveries is determined by generation load and plant fuel selection. The two ammonia tanks have gross and working capacities of 2,000 and 1,600 gallons each, respectively. At full load on natural gas, ammonia deliveries are required approximately every 10 to 14 days. At full load on fuel oil, ammonia deliveries are approximately every 2.0 to 2.5 days.

Ammonia deliveries are only accepted during daylight hours. During the ammonia unloading operations, no vehicles, except for the tanker truck, are allowed in the vicinity of the unloading and storage facilities. Two (2) trained GE Newington Energy employees wearing required personnel protective clothing and equipment are in attendance during the entire unloading process. The ammonia liquid unloading and vapor return hoses are connected and disconnected by the tanker truck driver. A copy of the detailed unloading procedures is located in the combined Risk Management Plan (RMP) and Process Safety Management Plan (PSM) Appendix E. Copies of the unloading procedure are also maintained in the control room. GE Newington Energy employees assigned to the unloading operations have the procedures with them during the ammonia transfer.

The location of the unloading connections on tanker trucks can vary with some having connections at the rear of the trailer, while others have side unloading connections located approximately in the middle of the trailer. All tanker trucks are required to back into the tanker truck unloading containment area that is located adjacent to the manifolds. Since there is a potential that the driver may inadvertently make contact with the manifolds, Newington Energy has implemented a requirement that unloading be attended by at least two Newington Energy employees who will assist the delivery driver in safely positioning the tanker truck.

4.1 - Hose and Manifold Venting After Unloading

Currently, the venting of the ammonia lines is managed by connecting a hose to the vent lines and allowing the vapor to discharge into a 55-gallon drum partially filled with water, allowing the anhydrous ammonia to be converted to ammonium hydroxide. During the 2002 PHA, the team was concerned with clearing the liquid ammonia from the unloading hose. However, it has not been an issue as only a small amount remains between the valve on the end of the hose and Newington Energy's manifold valve. To manage this small amount of ammonia, the area is vented before disconnecting.

The team discussed the current arrangement used to vent the ammonia at the manifold. A vent hose is attached to the vent line at the manifold and draped into the fifty-five gallon drum of water for dilution. Although this procedure has not resulted in any accidents, there is the potential that pressure in the hose could dislodge it from the drum resulting in a minor release of ammonia. However, a more serious potential concern could be the hose injuring nearby personnel as it exits the drum. From this conversation, Newington Energy indicated that a change order would be processed to install a check valve and flow control on the hose. The check valve will prevent the potential draw of water into the vent line, while the flow valve will eliminate the potential for the hose becoming instantaneously pressured allowing it to be dislodged from the drum. In addition, the team recognized that the drum of water should be secured in the loading area to prevent it from being spilled and discharging its contents.

4.2 - Driveaway Anchors

The team reviewed the initial PHA discussion and concerns regarding the design of the driveaway anchors at the unloading area. The driveaway anchors are intended to assure that the facility's piping and valves remain intact in the event that a tanker truck drives away without first disconnecting the hoses. The PHA team reviewed the existing manifold supports and anchoring system and believes that they are sufficiently strong to withstand the potential driveaway forces without damage to the plant's unloading manifold, manifold valves, and piping. In addition, the team agreed the unloading procedure, that requires two (2) Newington Energy employees to be present along with a complete checklist that is used while unloading, is adequate to minimize the potential for hoses to remain attached to the

manifold while the tanker truck drives away. However, the team agreed that some general signage at the loading area would provide a visual reminder to the unloading team to ensure adherence to certain critical procedures.

4.3 - Custody Transfer Measurement

The PHA team reviewed the question of custody transfer measurement during ammonia deliveries that was raised in the initial PHA. The current unloading procedure partially addresses the question of custody transfer measurements, whereby the tank levels are recorded prior to filling and monitored to ensure that the tanks reach but do not exceed 80% volume. The procedure does not include recording the temperature, which would be necessary to verify the actual amount received. This needs to also occur upon completion of transfer.

The team recommended appropriate custody transfer procedures, along with verification of the quantity received, be developed and agreed upon with the ammonia supplier. If necessary, the tanker truck unloading procedure should be updated to reflect these changes, as appropriate.

4.4 - Ammonia Tank Overfills

Since the tanker truck trucks normally arrive carrying more ammonia than either of the plant's storage tanks are capable of receiving, each delivery has the potential for an ammonia tank overfill. The hazards associate with severe tank overfills include:

- Liquid ammonia releases from the tank relief valves; and
- Sending liquid rather than vapor to the process.

The team reviewed the safeguards that are employed to prevent tank overfills. Since operator awareness of the expected filling time is an important part of avoiding overfills, Newington Energy has implemented an unloading procedure that contains redundancies to minimize the potential for overfilling the tanks.

The maximum allowable fill level in the tanks is 82% of their gross capacity. Each ammonia tank is fitted with three level instruments:

- An electronic level transmitter, LT-1570;

- A local level indicator, LI-1571; and
- A maximum fill level trycock, HV-521.

The electronic level transmitter (LT-1570), remote level indication (LI-1570), and high level alarm (LSH-1570) are monitored in the control room. The local level indication (LI-1570A) and high level alarm (LAH-1570) are monitored and activation at the truck unloading station.

The local level indicators, LI-1571, are float gauges. The dials for gauges are located on the west side of each tank. The electronic level transmitter, LT-1570, has a local level indicator, LI 1570A, at the truck unloading station. During the initial PHA, the team noted that the dials are too small to be readable from a distance and that the dial on the east tank cannot be seem from the truck unloading station. The team also expressed some reservation about the safety of using the trycocks located on the tank's top on a routine basis. During the recent inspection of the area, it appeared that the dials were adequately sized to be readable from the manifold and unloading area. If necessary, the Newington Energy employees can use binoculars to sight the gauges from a distance.

4.5 - Removal of Liquid from Storage Tanks

As constructed, the existing system does not include provisions for readily removing liquid from the tanks in the event of an inadvertent overfill. While slight overfills are tolerable, severe overfills should be dealt with promptly. The initial PHA team recommended that procedures for dealing with accidental tank overfills be developed and included in the operating procedures. At the time of the PHA, procedures had not been developed. However, it was anticipated that during the Fall 2007 outage that the cross-connection, which has been purchased, would be installed. As anticipated during the PHA, the cross-connection was completed along with the revised operating procedure in November 2007. This cross connection, equipped with manual block valves, allows the transfer of ammonia between tanks as needed (i.e. maintenance activities, etc.). The addition of the piping minimizes the need to remove large amounts of liquid ammonia from the system.

4.6 - Written Procedures

Since the initial PHA, site specific unloading procedures and injection system operating procedures have been developed and implemented. The ammonia vender (Tanner,

Inc.) has reviewed the unloading procedure as per the initial PHA recommendation, which has been implemented by Newington Energy.

5.0 - AMMONIA STORAGE TANKS

The team discussed the general safety, operability, and maintainability of the ammonia storage tanks and the piping within the impounding basin.

5.1 - Water in the Impounding Basin

During the initial review, the team considered the removal of accumulated rainwater and/or melted snow and ice from the impounding basin surrounding the ammonia tanks. The basin was constructed without a sump or heaters, which could potentially result in water levels rising enough to short out electrical equipment or instrumentation located within the basin. Currently, Newington Energy operates a small portable pump in the basin to remove accumulated stormwater from the basin. However, Newington Energy staff indicated that there has been recent discussions regarding the accumulation of water in this containment area. Newington Energy considered installing a canopy over the tanks and basin areato eliminate stormwater from collecting in this basin. This canopy was completed in the Fall of 2007.

In addition, since the initial PHA, a water deluge system has been installed over the ammonia tanks. The system has been designed to be manually operated to keep the tanks cool in the event of a fire or other heat source in the vicinity of the ammonia storage tanks. The system can also be activated to disperse small amounts of ammonia. Guidelines for use of water on spills found in sections 4.2.2 and 4.2.3 of the 1999 edition of *ANSI K61.1, Safety Requirements for the Storage and handling of Anhydrous Ammonia* were used to develop operation procedures for this system. The developed operation procedures indicate that the deluge system should not be used with a significant spill.

5.2 - Pipe Dope Specification

As a follow-up to the initial discussion regarding the general design, arrangement, and construction of the process piping around the ammonia tanks, Newington Engergy has identified the pipe dope requirement in their NEL Job Safety Analysis.

5.3 - Tank Interconnections

During the initial PHA, the team noted that there were no liquid or vapor crossover connections between the two ammonia tanks. Based on conversations during that meeting and consideration for maintenance, Newington Energy planned to install a new liquid crossover pipe. This manufactured pipe was installed during the Fall 2007 Outage. The crossover line will simplify the process of taking a tank or vaporizer out-of-service for maintenance and will facilitate transferring liquid ammonia between tanks for operational and/or maintenance reasons.

5.4 - Emergency Shutdown System

Since the initial PHA, a remote emergency shutdown device (ESD) for the storage tanks has been installed. With the improved equipment, a member of the fueling team can remotely activate the EDS that is equipped with pneumatic cylinders for remote operation of these internal valves that control product flow into the tank. When air pressure is applied to the cylinder, the valve opens. Upon loss of air pressure, the valve automatically closes.

5.5 - Tank Relief Valves

At the initial PHA, the team noted that the relief valves on the top of the ammonia storage tanks discharge vertically upward next to the operating platform at about waist level. At that time, the team judged this arrangement to be a potential hazard and recommended the addition of stack extensions with rain caps. Newington Energy researched the feasibility of installing the stack extensions. However, information obtained regarding other facilities indicates that an extended stack may hamper the ability of the valve to function properly. Therefore, Newington Energy does not plan to extend the stacks. However, the valves on top of the tanks have been replaced with a dual port valve for positive isolation. Newington Energy has also implemented a preventive maintenance program to inspect the valves and replace them on a specified frequency.

5.6 - Tank Surveillance

Since the initial PHA, the plant's CCTV camera system for remote observation of the ammonia storage tank and tanker truck unloading area from the control room has been

installed in an area that provides a clear view of the ammonia storage tank and tanker truck unloading area.

5.7 - Tank Commissioning and Removal from Service

From the initial PHA, Newington Energy has developed procedures for commissioning the ammonia tanks. Once the cross connection is installed, the team recommended that specific procedures be developed for emptying and purging the ammonia tanks for maintenance procedures.

6.0 - VAPORIZERS

The team reviewed the potential operating problems and hazards associated with the operation of the vaporizers. Each ammonia storage tank is equipped with a 40 kW electric vaporizer designed to maintain approximately 100 psig and 64°F in the storage tanks during normal operations. This tank pressure is required to assure adequate flow to the process.

6.1 - Storage Tank Overpressure

The team considered the potential hazards of high tank pressure caused by vaporizer control malfunctions. The temperature and pressure in the ammonia storage tanks can be read using the local temperature gauges, TI-1570, and pressure gauges, PI-1571. The tank pressure transmitter, PT-1570, provides remote indication of tank pressure, PI-1571, in the control room.

An independent tank pressure switch, PSH-1752, set at 165 psig, provides a remote high tank pressure alarm, PAH-1572, in the control room. The saturation temperature of ammonia at this pressure is approximately 88°F. The relief valves on the storage tanks are set for 265 psig. The saturation temperature of ammonia at this pressure is approximately 118°F. High temperature switch TSH-1571 limits the temperature of the heating elements in the vaporizer to 200°F. The saturation pressure of ammonia at this temperature is over 400 psig.

The storage tank pressure controller, PIC-1570, controls the operation of the vaporizer to maintain a normal operating pressure of 100 psig in the ammonia storage tank. If this controller malfunctions, and the control room operator fails to notice or appropriately respond to the tank high-pressure alarm, there is the possibility that ammonia vapor could be released through the tank pressure relief valves.

As such, the team believes that there is enough redundancy in the system to control the potential hazard through the existing tank monitoring instrumentation and operating procedures.

6.2 - Anhydrous Ammonia Specification

In the initial PHA, the team reviewed the original ammonia system plans and specifications for the use of commercial grade ammonia, which contains between 2,000 and 5,000 PPM water to help reduce the chances of stress corrosion cracking (SCC) of certain materials under certain conditions. Plant personnel investigated the possibility of switching to metallurgical grade ammonia, which typically contains less that 10 PPM of water.

Members of the team expressed concern that the commercial grade ammonia would result in the potential accumulation of water in the vaporizer and the storage tanks to a point that the vaporizers could no longer maintain the required pressure in the storage tanks. If this occurred, it would be necessary to drain and dispose of the accumulated aqueous ammonia in the tanks and/or the vaporizers.

However, Newington Energy found that the water concentration in the ammonia was not an issue. Further, the team stated that they occasionally need to add de-mineralized water to the system to maintain the appropriate quality of ammonia for equipment function. In addition, if higher-grade ammonia were to be used, stress fractures would become a greater concern. Based on this information, the team agreed that there is no need to change the type of ammonia received. However, it is recommended that Newington Energy develop a procedure for adding de-mineralized water to the ammonia storage tanks.

7.0 - TRANSFER LINE AND SCR AMMONIA INJECTION SYSTEM

The team briefly reviewed and found no significant hazards with the design and operation of the transfer line and the SCR ammonia injection system. Since the initial PHA, Newington Energy has developed procedures for safely inspecting and maintaining the ammonia filters, 1C1-FLT-1001.

8.0 - CONCLUSIONS

The anhydrous ammonia system at the Newington Energy facility has been designed to minimize the risk for a release through several redundant systems that include visual, audible, automated, manual and remote operations. Newington Energy's commitment to provide proper training to personnel also assists in reducing the risks associated with the handling and maintenance of the anhydrous ammonia system. The established operating procedures, controls, and training developed for the subject process result in a low level of exposure risk from process hazards associated with the use of anhydrous ammonia at the Newington Energy facility.

Appendix A

PHA Presentation Materials

Newington Energy, LLC
RMP/PSM Program
Process Hazard Analysis (PHA)

May 8, 2007

Triton Environmental, Inc. & PHA Team

Presentation Overview

- Risk Management Plan (RMP)/Process Safety Management (PSM) Overview
- Process Hazard Analysis (PHA) Requirements
- Methodology of PHA
- Description of Newington Energy LLC Process - Anhydrous Ammonia (with assistance from PHA Team)
- Completion of the PHA

RMP/PSM Overview

- Risk Management Plan (RMP) - EPA Program
- Process Safety Management (PSM) - OSHA Program
- Applicability for Newington Energy
  - Greater than 10,000 lb. Anhydrous Ammonia
  - Program 3 - Due to proximity to Public Receptors and applicability of OSHA PSM

RMP/PSM Overview

- Main Elements of RMP/PSM
  - Hazard Assessment;
  - Process Safety Information;
  - Process Hazard Analysis;
  - Operating Procedures;
  - Training;
  - Mechanical Integrity;
  - Management of Change;

RMP/PSM Overview

- Main Elements of RMP/PSM (cont.)
  - Pre-Startup Review;
  - Compliance Audits;
  - Emergency Response;
  - Incident Investigation;
  - Employee Participation;
  - Hot Work Permit; and
  - Contractors.

PHA Requirement

- Process Hazard Analysis - Evaluate and identify the on and off-site impacts to workers, the public, or the environment.
- Various methodologies available (HAZOP, Checklist, What-If, What-If/Checklist, etc.)
- Selected Method - What-If/Checklist
  - Will allow for identification of most common hazards that exist in a process.
  - Recommended methodology for Construction/Startup and Routine Operations

PHA Requirement

- What-If/Checklist
  - Select specific activities and operations
    - Loading/charging System
    - Routine System Operations
    - Natural Hazards
    - External Hazards
  - Work through each item in Checklist
- Recommendations
  - Administrative or Engineering Control

PHA Checklist Review Items

- **Hazards of the process;**
- **Previous Incident which had a likely potential for catastrophic consequences;**
- **Engineering and Administrative Controls;**
- **Consequences of Failure of Engineering and Administrative controls;**
- **Stationary Source Siting;**
- **Human factors; and**
- **Possible safety and health effects of failure of controls (qualitative).**

PHA Requirement

- Description of the team
  - PHA completed by a team with expertise in engineering and process operations
  - At least one employee who has experience and knowledge specific to the process being evaluated.
  - One member of the team must be knowledgeable in the specific process hazard analysis methodology being used.
  - Description for the Record of each member

PHA Requirement

- PHA Report
- Recommendations
- Implementation of Recommendations
  - Schedule for follow-up
  - Communicate actions to operating, maintenance and other employees
- Rejection of Recommendations
- Incorporation into RMP/PSM Manual

Newington Energy LLC
Anhydrous Ammonia Process

- Storage Tank
- Ammonia Vaporizers
- Ammonia Flow Control (HSRGs)
- Piping
- Loading/Draining System
- Maintenance/Parts Isolation
- Safety

PHA Review

- Discussion
- Document Review
- Scenario Review
- Completion of Paperwork

Appendix B

Tables

TABLE 1
Checklist
Process Hazard Analysis
GECS/Newington Engergy, 200 Shattuck Way, Newington, NH

1. **Hazards of the process**
   - Toxic chemical hazards
   - Hazards of liquid leaks or spills
   - Hazards of vapor releases
   - Falling, tripping, or mechanical hazards
   - Electric shock hazards
   - Fire hazards

2. **Previous incidents** (Intended for existing facilities: "The identification of any previous incident which had a likely potential for catastrophic consequences in the workplace.")
   - Leaks and spills
   - Personal injuries
   - Near misses and close calls

3. **System controls** ("Engineering and administrative controls applicable to the hazards and their interrelationships such as appropriate application of detection methodologies to provide early warning of releases. *e.g*., process monitoring, control instrumentation with alarms, and detector hardware ...")
   - Process controls
   - Alarms, warnings, and communication
   - Procedures, standards, and response plans

4. **Consequences of failure of engineering and administrative controls**
   - Process controls
   - Alarms, warnings, and communication
   - Procedures, standards, and emergency response plans

5. **Facility siting**
   - Spill flow paths and impoundment design
   - Effect of equipment layout on potential for incident escalation
   - Access and escape routes
   - Piping and equipment vulnerability to vehicles

- Fire mains, hydrants, and fixed protection systems

6. Human Factors

- Errors of commission or omission by employees
- Errors of commission or omission by contractors
- Errors of commission or omission by third parties (truck drivers; regulatory officials; neighboring facility staff)
- Communication within plant and with third parties

7. Safety and Health Effects (A qualitative evaluation of a range of the possible safety and health effects of failure of controls.)

- Frequency (likelihood) of incident
- Severity (consequences) of incident

TABLE 2
Initial 2002 PHA Recommendations
Process Hazard Analysis
Newington Energy, 200 Shattuck Way, Newington, NH

No.	Recommendation	Discussion	Status
1	The discharge of the manifold vent valves should be directed to a safe location.	§4.1	Considered, but rejected.
2	Review the mechanical design of the driveaway anchors.	§4.2	Reviewed to be adequate.
3	Include any necessary elements of custody transfer measurement in the unloading procedure.	§4.3	Completed.
4	Develop appropriate methods to predetermine the volume of ammonia to be unloaded and include them in the procedure.	§4.4	Completed.
5	Develop appropriate steps for tank level monitoring during unloading and include them in the procedure.	§4.4	Completed.
6	Develop procedures for dealing with accidental storage tank overfill and include them in the procedure.	§4.5	Complete upon installation of cross connection. Completed November 2007.
7	Add a manual block valve to each tank drain.	§4.5	Considered, but no beneficial due to increased potential for leaks.
8	The final ammonia tanker truck unloading procedure should be reviewed and agreed upon by Newington Energy and the ammonia vendor before operations commence.	§4.6	Completed.
9	Include appropriate guidance for the use of the impounding basin water deluge system in the written procedures.	§5.1	Completed.

No.	Recommendation	Discussion	Status
10	Review the piping specifications to assure that the dope specified and used in the ammonia piping system is suitable for ammonia service.	§5.2	Completed.
11	Investigate the possible advantages of liquid and vapor crossover lines.	§5.3	The liquied crossover pipe has been manufactured for installation in Fall 2007. Liquid line completed November 2007. Vapor crossover still under consideration.
12	Evaluate the advantages of retrofitting an effective remote ESD system for the tank nozzle valves.	§5.4	Completed.
13	Add stack extensions (with rain caps) to the storage tank relief valves.	§5.5	Stack extensions not feasible, but replaced tank valve
14	One of the plant's CCTV cameras should be located to provide a clear view of the ammonia storage tank and tanker truck unloading area.	§5.6	Completed.
15	Develop a procedure for commissioning and emptying and purging the ammonia storage tanks.	§5.7	Completed, emptying/purging will be revised to accommodate crossover pipe. Completed November 2007.
16	Newington Energy should continue its efforts to get the use of pure ammonia approved.	§6.2	Considered, but not practicable.
17	If the use of pure ammonia is not eventually approved, Newington Energy should develop procedures for the safe removal and disposal of aqueous ammonia that accumulates in the vaporizers and the tanks.	§6.2	Considered, but not practicable.

No.	Recommendation	Discussion	Status
18	If the use of pure ammonia is not eventually approved, Newington Energy should review the safety, location, operability, arrangement, and configuration of the existing tank and vaporizer drain valves.	§6.2	Considered, but not practicable.
19	Develop appropriate procedures for safely inspecting and maintaining the ammonia filters, 1C1-FLT-1001 to be included in the maintenance procedures.	§7.0	To be completed.

TABLE 3
Updated PHA Recommendations (2007 Review)
Process Hazard Analysis
Newington Energy, 200 Shattuck Way, Newington, NH

No.	Location	Recommendation	Discussion	Status
1	Manifold Vent Line	Install check valve and flow control on vent hose line	§4.1	Completed July 2007.
2	Water Drum adjacent to Manifold	Secure drum to avoid accidental spill.	§4.1	Completed July 2007.
3	Signage at Loading Area	Install general safety signage in unloading area (i.e. no smoking, chock wheels, attend to vehicle during unloading, etc.).	§4.2	Completed August 2007.
4	Custody of Product Transfer	Develop appropriate methods to verify amount of ammonia delivered.	§4.3	Current volumetric methods are utilized. Method of confirming delivery volumes under consideration as part of billing verification.
5	Addition of De-mineralized (Demon) Water	Develop procedures for adding demon water to system.	§4.5	Completed November 2007.
6	Stormwater removal from Secondary Containment	Install roof over tank containment.	§5.1	Completed August 2007.
7	Emptying and Purging Tank	Develop appropriate procedures for emptying and purging tanks and modify procedure as necessary when cross connection is operational.	§5.7	Included language in Ammonia Procedures Guidelines Rev. 11.
8	Ammonia Filters in SCR	Develop procedures for inspecting and changing filters.	§7.0	Considered, but not beneficial due to increased potential for leaks.

TABLE 4
Team Participants
Process Hazard Analysis
Newington Energy, 200 Shattuck Way, Newington, NH

David Argyros, EH&S Manager.

Mr. Argyros graduated from Worcester Polytechnic Institute with a B.S. in Civil/Environmental Engineering and has managed diverse EH&S projects for over 20 years. Projects have included emergency responses to chemical releases, Superfund site clean-ups, HazWoper training, and scheduled maintenance.

Chad Harrison, GE Newington Energy Operation Manager

Mr. Harrison graduated from the Maine Maritime Academy and spent a number of years at sea as an engineer with responsibilities for the mechanical systems aboard ship. He started as a power plant operator at a co-generation plant in a paper mill and then as an Engineer with Newington Energy before becoming an Operations Manager.

Tom Fallon, GE Newington Energy Power Plant Manager

Mr. Fallon has over 15 years with GE in power generation management.

Marke Uhlar, GE Newington Energy Maintenance Manger

Mr. Uhlar has experience in GE field services.

Joshua Leighton, GE Newington Energy Engineer

Mr. Leighton is a Maine Maritime graduate and is responsible for quality documentation and management of change (MOC).

Paul Simonetta, CHMM, Triton Environmental, Inc.

Mr. Simonetta is a environmental consultant with over 10 years of environmental compliance consulting experience. His experience includes assistant of industrial facilities to comply with environmental regulations associated with the transfer, storage and usage of hazardous materials, including several facilities that maintain liquified ammonia systems.

Beth Jennings, P.E., Triton Environmental, Inc.

Ms. Jennings is a civil engineer (B.S., University of New Haven) whose experience includes environmental consulting for several facilities that maintain liquefied ammonia systems. Her experience includes system and component reviews as part of completing response management plans and the completion of process hazard analysis for the systems.

Appendix E

Procedures

Operating Procedure 4.09 – Anhydrous Ammonia System/SCR
Off-Loading (Hazardous Chemical Delivery) Procedure
Emergency Response Procedure ERP-09
Lockout/Tagout (LOTO) Procedures

Facility Copy Approved for Use:	Date Approved:

Operating Procedure 4.09
Anhydrous Ammonia System / SCR

Table of Contents

Anhydrous Ammonia System

Table of Contents (cont)

Purpose

This operating procedure describes the required steps and the associated information to safely perform Anhydrous Ammonia Storage and Injection system and component start up and shut down and operate this system and components under normal conditions and within specified operating limits.

References

The following references should be reviewed prior to performing this operating procedure:

Piping and/or Process and Instrumentation Diagrams.

- 885200-1-PD-4-AM. 1-1 Ammonia Injection System.
- 885200-1-PD-4-HR. 1-6 HRSG – Exhaust and CEMS System.
- DF1-101 DNX Vendor Drawing – Anhydrous Ammonia Tank.
- KU2-409-503, Sheet 2, Ammonia Flow Control Skid.
- KU2-409-503, Sheet 3, Ammonia Injection Grid.
- 1371-1, Hitachi Operation, Maintenance and Safety Manual for Selective Catalytic Nox Reduction System Catalyst.
- DNX Engineers Anhydrous Ammonia Storage System Technical Manual.
- Aalborg HRSG Operation and Maintenance.
- Material Safety Data Sheet (MSDS) for Anhydrous Ammonia

Special Tools/Equipment

The following tools and equipment should be staged prior to performing this operating procedure:

- Personal Protective Equipment (hardhat, safety glasses, gloves, etc)
- Copy of Operating Procedure
- Flashlight (if applicable)
- Radio

General Precautions and Limitations

Caution

Particular attention should be given to normal operating conditions of the system, its equipment, and components to detect variations from there normal conditions and function. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible.**

Caution – Precautions to Prevent Exposure

Each employee involved in the handling of Anhydrous Ammonia while performing specific job functions will be required to wear gloves, goggles and a protective over garment.

The SCR system has engineering controls, including cutout switches and pressure relief valves, to minimize the danger of ammonia exposure due to equipment failure. These controls are described in the following sections.

Caution – Quality Control and Inventory Control

Impurities in the chemicals used in the system can damage the equipment and cause increased equipment wear, plugging, or corrosion. In order to ensure that the correct raw material grades are used, WCE uses reliable vendors.

Ammonia is delivered directly to the ammonia storage tank on site. Ammonia is typically ordered in 2,000-gallon quantities and added directly to the storage tank on an as-needed basis. No cylinders for topping off the system are kept on site.

Caution – Consequences of Deviations

Operation of the ammonia system without following proper procedures can result in reduced employee safety, reduced equipment efficiency, premature equipment failure, increased repair and maintenance expenses, and/or release of ammonia to the workplace or environment.

See the following sections of this SOP as well as the Process Hazard Analysis documentation (in the PSM written program manual) for consequences of deviations from operating limits established for specific equipment.

Process Overview

Ammonia has many applications. One important application is that for selective catalytic reduction (SCR) of air pollutants (nitrogen oxides) generated from the burning of fuel used to create electricity. The predominant source of nitrogen oxides (NO_x) emissions from natural gas turbines is the thermal NO_x formation reaction, which is very dependent on combustor design This reaction converts natural atmospheric nitrogen (N_2) and O_2 to NO_x at the high temperatures of combustion.

SCR is a post-combustion gas treatment technique used for the reduction of NO and NO_2 in the turbine exhaust stream to molecular nitrogen and water. Aqueous or anhydrous ammonia (NH_3) is typically used as the reducing agent. The basic reactions are:

$$4\ NH_3 + 4\ NO + O_2 \longrightarrow 4\ N_2 + 6\ H_2O$$
$$8\ NH_3 + 6\ NO_2 \longrightarrow 7N_2 + 12\ H_2O$$

Typically, a fixed-bed catalytic reactor is used for SCR. The function of the catalyst is to lower the activation energy of the NO_x decomposition reaction with ammonia.

The three basic steps of the process are as follows:

1. Draw ammonia gas from the storage tank to the skid.

2. Generate air (via the air blower on the ammonia flow control unit) and mix it with the ammonia such that the ammonia/oxygen mixture is at the proper concentration and temperature for catalytic conversion to nitrogen and water.

3. Inject the ammonia/air mixture uniformly into the generator exhaust ducts through a system of manifolds, injection probes, and injection nozzles to achieve the effective mixing and conversion of NO_x to nitrogen and water.

The major components of the ammonia SCR system are listed below:

Component	Description
Storage Tank	13,000-gallon SA516-70 steel tank Level control to 85% of total tank volume (or 10,000 gallons of ammonia)
Ammonia Vaporizers	Two (2) electrically operated 108 kW vaporizers
Ammonia Flow Control Unit	

Piping	ASTM A-106 Grade B seamless schedule 80 welded pipe Used to transfer ammonia through the vaporizer loop and from the tank to the ammonia flow control unit.

The procedures provide details to be used to operate the ammonia SCR system.

Caution – Hazards of Ammonia

Anhydrous ammonia is present within the SCR system as a liquid and as a gas. Anhydrous ammonia is much more concentrated than household ammonia and, because of this concentration, it is much more dangerous to people exposed to it. Anhydrous ammonia is listed as an Extremely Hazardous Substance High pressures in the storage tank raise its boiling point so it is a liquid in those areas, but when the pressure is reduced the ammonia will become vapor. Liquid ammonia that is exposed to the atmosphere will evaporate very quickly, creating a potential inhalation hazard. Ammonia is very corrosive to skin, eyes, lungs and other human tissue. Avoid coming in contact with anhydrous ammonia or breathing its vapors. Fortunately, the pungent, irritating odor of ammonia, and its irritating effects can be detected by most people at very low concentrations providing early detection of releases.

Although ammonia does not meet OSHA's definition of a "flammable gas", it will burn at certain concentrations (15 to 28% flammable range). Mixtures of ammonia and oil mists are much more flammable and can ignite at concentrations near 3000 ppm. Extra caution should be exercised if an ammonia/oil mist is visible.

Start Up Procedures

Start Up Precautions and Limitations

Caution

Particular attention should be given to normal operating conditions of the system, its equipment, and components to detect variations from there normal conditions and function. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible.**

Caution

Contact with liquid Anhydrous Ammonia causes severe burns of the eyes and skin. The liquid "FREEZES" the skin on contact, although the skin is still being subjected to severe burns.

Caution

During the first few hours of fans, blowers, pumps, motors, etc. and overall system operation, check the equipment and system frequently for such conditions as excessive heating of bearings, vibration, unusual noises, etc. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible.**

Caution

Operating Limits: Never exceed the rated working pressure ratings of the storage tank or transfer hose during system recharge. The maximum allowable working pressure of the ammonia storage tank is 265 psi at 120 °F. Do not overfill the storage tank. The tank should not be filled more than 85% full (10,000 gallons or 57,000 pounds). Check the level before and during the ammonia charging operation to ensure that 85% level is not exceeded.

Consequences of Deviations: Over-pressuring the storage tank or transfer hose can cause the equipment to rupture or relief valves to lift resulting in release of ammonia. This may damage equipment and cause injury to workers due to sudden release of pressure and/or exposure to ammonia

Improper hose connections or use of defective hoses can result in ammonia leaks. This can expose workers to sudden release of pressure and/or exposure to ammonia liquid and/or vapor.

Overfilling the ammonia storage tank can result in inefficient operation of the system and possible damage to equipment.

Normal operation of the vessels uses float switches and pressure cutouts to control liquid levels, and protect against over-pressure, but operators need to be aware of the safe operating range and adhere to it in all modes of operation.

Actions to Correct Deviations: Report low levels to the Maintenance Manager. A low level in the storage tank indicates that the system requires recharging. Excessive ammonia loss may be an indication of leaks in the system and should be investigated and corrected.

Increases of ammonia level above the normal operating level may indicate that the SCR system is malfunctioning. This situation should be reported to the Maintenance Manager and investigated.

Deviations above the maximum allowable pressure are dangerous and can cause failure of the equipment, which can result in injury or death due to sudden release of pressure and anhydrous ammonia. The SCR system is equipped with high pressure switches and pressure relief valves to prevent this from occurring. Shut the system down immediately and notify the Maintenance Manager if this occurs.

Special Precautions: When working on the ammonia system equipment during maintenance or repairs, always use the buddy system and follow lock-out/tag-out, confined space entry, and equipment isolation and evacuation procedures.

Table 1 - Setpoints

Anhydrous Ammonia System	
Minimum Ammonia Storage Tank Pressure	50psig
1AM- PIC-0295 Setpoint	50psig
Ammonia Line Pressure Regulator PCV-300 Setpoint	50psig
Ammonia Storage Tank Pressure Relief Valves PSV-101, 102, 103, 104, Setpoint	265psig
Ammonia Storage Tank Fill Line Pressure Relief Valve PSV-105 Setpoint	350psig
Ammonia Vaporizer Loop Pressure Relief Valves PSV-201A & 201B Setpoint	265psig
Ammonia Lines Pressure Relief Valves PSV-106 & 107 Setpoint	350psig
Ammonia Storage Tank Level, Diff Pressure 1AM-LT-0296 Range	-76.22 to -29.93"WC
Ammonia Vaporizer Panel Temp. Switch High 1AM-TSH-0297A & 0297B	350 deg. F
Ammonia Tank Maximum Operating Level	85% capacity
Ammonia Injection Manifold Differential Pressure AM-DP-1271-01 thru AM-DP-1271-12 normal Operating condition	4"H_2O
Ammonia Flow Control Unit Air Flow SC-FE-1178	Normal=333 scfm Minimum=266 scfm
Ammonia Flow Control Unit Air Flow SC-FIT-1178	Max=9" H_2O Norm.=5.77" H_2O Min.=3.69" H_2O

Table 1 - Setpoints (cont.)

Anhydrous Ammonia System	
Ammonia Flow Control Unit Gaseous Ammonia Flow, AM-FIT-1175	0-80 LBS/HR
Ammonia Flow Control Unit Gaseous Ammonia Pressure, AM-PI-1267	Operating pressure: 10psig
Ammonia Flow Control Unit Gaseous Ammonia Pressure Regulator, AM-PCV-1158 Setpoint	10 psig
Ammonia Flow Control Unit Instrument Air Pressure Switch, AM-PSL-1134 Setpoint	60 psig
Ammonia Flow Control Unit Instrument Air PRV-502 Setpoint	20 psig

Table 2 - Start Up Prerequisites

Step Number	Step
1.	LINE UP the Electrical components in the System in accordance with **TABLE11.** Variations in line-up configurations are to be expected in the event of OOS (Out Of Service) equipment/trains or maintenance and their status will be recorded per plant administrative procedures.
2.	LINE UP the system in accordance with **Tables 12, 13 and 14. The pre-start up valve line-ups are only required for initial system start up or following major system maintenance** Variations in line-up configurations are to be expected in the event of OOS (Out Of Service) equipment/trains or maintenance and their status will be recorded per plant administrative procedures.
3.	Verify that the plant A.C. Electrical System is in operation per Operating Procedure 5.1.
4.	Verify that the plant D.C. Electrical system is in operation per Operating Procedure 5.2.
5.	Verify that the plant Instrument Air System is in operation per Operating Procedure 4.3.
6.	Verify the integrity of the Ammonia Storage System and the SCR Ammonia Injection System by performing operator walkdown.
7.	Verify that there are no **"OPEN"** work orders for the Ammonia system or that if there are still work orders open that they will not affect the safe operation of the system.
8.	Verify sufficient level in the Ammonia Storage Tank for proper operation of the Ammonia System.
END	**END**

Table 3 - Local Start Up Anhydrous Ammonia Storage System

Step Number	Step	
1.	Verify that all start-up Pre-requisites have been completed per Table 1.	
	Potential Hazards	Recommended Action
2.	At local control panel close in Circuit Breaker 1.	
	Potential Hazards	Recommended Action
3.	At local control panel place the control power switch to "ON".	
	Potential Hazards	Recommended Action
4.	At local control panel select the vaporizer (heater) to be in service (heater "A" or heater "B"). Only one Vaporizer will be in service at any given time. The other Vaporizer will be used for back-up. Vaporizer selection can only be made from the local control panel. Selected Vaporizer will now function in Automatic.	
	Potential Hazards	Recommended Action
5.	Monitor the system for any leaks or any abnormal operation.	
	Potential Hazards	Recommended Action
END	END	

Remote Start Up Anhydrous Ammonia Storage System

NOTE:	REMOTE START-UP IS NOT AVAILABLE WITH THE ANHYDROUS AMMONIA STORAGE SYSTEM. MONITORING OF PRESSURES AND TEMPERATURES "ONLY" CAN BE MONITORED THROUGH THE PLANT DCS SYSTEM.

Table 4 - Local Start-Up Anhydrous Ammonia Injection System (AFCU)

Step Number	Step
1.	Verify that all start-up pre-requisites have been completed per Table 1.
	Potential Hazards | Recommended Action
2.	At the local control panel **"CLOSE"** CB (Circuit Breaker) 1.
	Potential Hazards | Recommended Action
NOTE:	Steps # 1 & 2 above are the only Local Operator Interface available with this part of the Anhydrous Ammonia System. All other start-up interface available is through the remote start-up utilizing the plant D.C.S. **SEE REMOTE START-UP OF AMMONIA INJECTION SYSTEM PER TABLE ?**
3.	After the AFCU system has been remotely started through the plant D.C.S., the outside operator will monitor the system for any leaks and abnormal operations of the A.F.C.U. System.
	Potential Hazards | Recommended Action
END	**END**

Table 5 - Remote Start-Up Anhydrous Ammonia Injection System

Step Number	Step
1.	Verify that all start-up pre-requisites have been completed per Table 1.
2.	Verify that the Liquid Ammonia Storage/Vaporizer System is in operation and open to the Ammonia Injection System Skids.
3.	At the Blower Skid Local Control Panel, **"CLOSE"** the main Circuit Breaker CB 1.
4.	Verify that the **"EMERGENCY STOP"** pushbutton **"HS-1135"** is pulled out at the local control panel.
5.	From the Blower Selector Switch in the D.C.S., START Blower F-01A or F-01B and verify that the selected blower is running at the D.C.S.
6.	From the D.C.S. verify that the air flow is in the **"NORMAL"** flow position. This can be verified by adjusting manual valve **HV-564 (or 565)** until flow transmitter **FIT-1178** registers 5.77" H_2O or 333scfm.
7.	From the D.C.S. energize the solenoid valve XY-1157. This will start the Ammonia Injection by opening flow valve XV-1157.

NOTE:	From the D.C.S. Manual Mode can be selected. The Ammonia flow in LBS/HR can be manually dialed for a selected flow. In this mode the flow of Ammonia will remain the same even though other control signals vary, including the NO_x tracking signal.

Table 5 - Remote Start-Up Anhydrous Ammonia Injection System (cont)

NOTE:	From the D.C.S. Automatic Operation Mode can be selected. When in the Automatic Mode the Ammonia flow will follow the setpoint set in the D.C.S. system **(TO BE DETERMINED LATER).** The Ammonia flow control valve FV-1175 will open and close to follow the 4-20-mA NO_x tracking signal received from the D.C.S. System.
END	**END**

Normal System Operations

Table 6 – Anhydrous Ammonia System Normal Operations

Step Number	Step
NOTE:	The Ammonia Storage System operates in the Automatic Mode. One Vaporizer (heater) will be in operation and the other Vaporizer will be in the locked out standby mode. These Vaporizers can be switched only from the local control panel. The Vaporizer in service will operate in automatic as pressure and temperature dictate. Pressures and temperatures can be monitored locally and from the D.C.S. and except for system monitoring and walk-downs by the outside operator no other operator interface is necessary.
NOTE:	The Ammonia Injection System (AFCU) operates in the Automatic Mode (however, manual mode can be selected but Automatic Mode will be normal operations). One Blower will be in operation which automatically places the other Blower in the locked out standby mode. Either Blower can be selected for operation from the D.C.S.. Temperatures and pressures can be monitored locally. Temperatures, pressures and flows can be monitored from the D.C.S. Except for system monitoring from the D.C.S. and locally by outside operator no other operator interface is necessary.
END	**END**

Shutdown Procedures

Shutdown Precautions and Limitations

Caution

Immediately following shut down, check the system to verify that conditions are normal. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible.**

Table 7 - Shutdown Prerequisites for Anhydrous Ammonia System

Step Number	Step
1	Shutting down the Anhydrous Ammonia system will only be allowed for very short time maintenance or when the entire train is to be shut down. Verify that shutting down the Anhydrous Ammonia system will not exceed the plants allowable Emissions discharge limits. **LIMITS AND SHORT TERM MAINTENANCE TIME ALLOWED TO BE DETERMINED LATER AND INSERTED INTO THIS PROCEDURE.**
END	END

Table 8 - Local Shutdown Anhydrous Ammonia Storage System

Step Number	Step	
1.	From local control panel turn HS-201 to the off position.	
	Potential Hazards	Recommended Action
2.	For long term shutdown open CB 1.	
	Potential Hazards	Recommended Action
END	END	

Table 9 - Remote Shutdown Anhydrous Ammonia Storage System

Step Number	Step
NOTE:	Remote shutdown is not available for the Anhydrous Ammonia System.
END	END

Local Shutdown Anhydrous Ammonia Injection System

Step Number	Step	
NOTE:	Local shutdown is not available for the Anhydrous Ammonia Injection System. Except for emergencies only.	
	Potential Hazards	Recommended Action
END	END	

Table 10 - Remote Shutdown Anhydrous Ammonia Injection System

Step Number	Step
1.	For normal shutdown, turn off the selected Blower from the D.C.S. system after which the following events will occur.
2.	The selected Blower will stop.
3.	The D.C.S. system will receive a dry contact signal that the Blower is off.
4.	The D.C.S. system will receive the air flow signal "go to zero air flow".
5.	The Ammonia flow valve XV-1157 will close via solenoid XY-1157.
6.	The Ammonia pressure transmitter PIT-502 will send a signal to the D.C.S. system of zero pressure.
7.	The Ammonia flow transmitter FIT-1175 will send a signal to the D.C.S system of zero Ammonia flow.
8.	The D.C.S. system will then close the Ammonia flow control valve FV-1175.
9.	For long term shutdown turn off the main circuit breaker CB 1.
END	END

Pre-Start Up Electrical Line Up

Table 11 – Anhydrous Ammonia System Pre-Start Up Electrical Line Up (Ammonia Dilution Skid & Ammonia Storage System)

Initials/ Check	Voltage	Position	MCC/Component Nomenclature
	480	Closed	MCC-1EP-MC-A, Bkr. 04A, 1CI-JB-00001, Ammonia Storage Vaporizer Panel
	480	Closed	MCC-1EP-MC-E, Bkr. 06KL, 1HR-AMM-1100, Ammonia Dilution Skid (AFCU)
	480	Closed	MCC-1EP-MC-F, Bkr. 051, 1HR-AMM-2100, Ammonia Dilution Skid (AFCU)

Pre-Start Up Valve Line Up

Table 12 - System Pre-Start Up Valve Line Up

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
SCR Ammonia Injection System (AFCU) – Train 1			
	Gate	Closed	1AM-DRV-1100-Drain/ Vent Upstream of Skid Inlet Valve 1AM-ISV-1101
	Ball	Open	1AM-ISV-1101-Isolation Ammonia To Train 1 SCR Skid (HV-547)
	Gate	Open	1AM-RTV-(Later)-Isolation 1AM-PI-1266 (HV-549)
	Ball	Open	1AM-ISV-1102-Isolation Inlet 1AM-XV1157 (HV-550)
	Air Operated	Auto	1AM-XV-1157-Isolation Ammonia Inlet To Pressure Control Valve 1AM-PCV-1158
	Air Operated	Auto	1AM-PCV-1158-Pressure Control Ammonia To AIG
	Globe	Closed	1AM-BPV-1100-Bypass 1AM-XV-1157 & 1AM-PCV-1158 (HV-551)
	Ball	Open	1AM-ISV-1102-Isolation Outlet 1AM-XV-1158 (HV-552)
	Ball	Open	1AM-ISV-1104 Isolation Inlet 1AM-FV-1175 (HV-559)
	Air operated	Modulate	1AM-FV-1175 Ammonia Flow Rate Control
	Ball	Open	1AM-ISV-1105 Isolation Outlet 1AM-FV-1175 (HV-560)
	Ball	Open	1IA-ISV-(Later) Instrument Air to Ammonia Dilution Skid

Table 12 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Globe	Closed	1AM-BPV-1101 Bypass 1AM-FV-1175
	Butterfly	Open	1CA-ISV-1100 Isolation Blower F01A Discharge (HV-564)
	Butterfly	Open	1CA-ISV-1101 Isolation Blower F01B Discharge (HV-565)
	Gate	Open	SCX-HV-542 Isolation SCX-PI-1270 Grid Leg Ammonia Injection Manifold
	Gate	Closed	SCX-HV-543 Drain Grid Leg Ammonia Injection Manifold
	Ball	Open	SCX-HV-541-01 Isolation Ammonia Injection Grid Leg #1
	Gate	Open	SCX-HV-540-01 Isolation Upstream SCX-DPI-1271-01 Ammonia Injection Grid Leg #1
	Gate	Open	SCX-HV-538-01 Isolation Downstream SCX-DPI-1271-01 Ammonia Injection Grid Leg #1
	Gate	Closed	SCX-HV-539-01 Isolation Equalizing SCX-DPI-1271-01 Ammonia Injection Grid Leg #1
	Gate	Closed	SCX-HV-539-01 Isolation Equalizing SCX-DPI-1271-01 Ammonia Injection Grid Leg #3
	Ball	Open	SCX-HV-541-02 Isolation Ammonia Injection Grid Leg #2
	Gate	Open	SCX-HV-540-02 Isolation Upstream SCX-DPI-1271-02 Ammonia Injection Grid Leg #4
	Gate	Open	SCX-HV-538-02 Isolation Downstream SCX-DPI-1271-02 Ammonia Injection Grid Leg #4
	Gate	Closed	SCX-HV-539-02 Isolation Equalizing SCX-DPI-1271-02 Ammonia Injection Grid Leg #4
	Ball	Open	SCX-HV-541-03 Isolation Ammonia Injection Grid Leg #3
	Gate	Open	SCX-HV-540-03 Isolation Upstream SCX-DPI-1271-03 Ammonia Injection Grid Leg #5

Table 12 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Gate	Open	SCX-HV-538-03 Isolation Downstream SCX-DPI-1271-03 Ammonia Injection Grid Leg #5
	Gate	Closed	SCX-HV-539-03 Isolation Equalizing SCX-DPI-1271-03 Ammonia Injection Grid Leg #5
	Ball	Open	SCX-HV-541-04 Isolation Ammonia Injection Grid Leg #4
	Gate	Open	SCX-HV-540-04 Isolation Upstream SCX-DPI-1271-04 Ammonia Injection Grid Leg #6
	Gate	Open	SCX-HV-538-04 Isolation Downstream SCX-DPI-1271-04 Ammonia Injection Grid Leg #6
	Gate	Closed	SCX-HV-539-04 Isolation Equalizing SCX-DPI-1271-04 Ammonia Injection Grid Leg #6
	Ball	Open	SCX-HV-541-05 Isolation Ammonia Injection Grid Leg #5
	Gate	Open	SCX-HV-540-05 Isolation Upstream SCX-DPI-1271-05 Ammonia Injection Grid Leg #5
	Gate	Open	SCX-HV-538-05 Isolation Downstream SCX-DPI-1271-05 Ammonia Injection Grid Leg #5
	Gate	Closed	SCX-HV-539-05 Isolation Equalizing SCX-DPI-1271-05 Ammonia Injection Grid Leg #5
	Ball	Open	SCX-HV-541-06 Isolation Ammonia Injection Grid Leg #6
	Gate	Open	SCX-HV-540-06 Isolation Upstream SCX-DPI-1271-06 Ammonia Injection Grid Leg #6
	Gate	Open	SCX-HV-538-06 Isolation Downstream SCX-DPI-1271-06 Ammonia Injection Grid Leg #6
	Gate	Closed	SCX-HV-539-06 Isolation Equalizing SCX-DPI-1271-06 Ammonia Injection Grid Leg #6
	Ball	Open	SCX-HV-541-07 Isolation Ammonia Injection Grid Leg #7

Table 12 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Gate	Open	SCX-HV-540-07 Isolation Upstream SCX-DPI-1271-07 Ammonia Injection Grid Leg #7
	Gate	Open	SCX-HV-538-07 Isolation Downstream SCX-DPI-1271-07 Ammonia Injection Grid Leg #7
	Gate	Closed	SCX-HV-539-07 Isolation Equalizing SCX-DPI-1271-07 Ammonia Injection Grid Leg #7
	Ball	Open	SCX-HV-541-08 Isolation Ammonia Injection Grid Leg #08
	Gate	Open	SCX-HV-540-08 Isolation Upstream SCX-DPI-1271-08 Ammonia Injection Grid Leg #08
	Gate	Open	SCX-HV-538-08 Isolation Downstream SCX-DPI-1271-08 Ammonia Injection Grid Leg #08
	Gate	Closed	SCX-HV-539-08 Isolation Equalizing SCX-DPI-1271-08 Ammonia Injection Grid Leg #08
	Ball	Open	SCX-HV-541-09 Isolation Ammonia Injection Grid Leg #09
	Gate	Open	SCX-HV-540-09 Isolation Upstream SCX-DPI-1271-09 Ammonia Injection Grid Leg #09
	Gate	Open	SCX-HV-538-09 Isolation Downstream SCX-DPI-1271-09 Ammonia Injection Grid Leg #09
	Gate	Closed	SCX-HV-539-09 Isolation Equalizing SCX-DPI-1271-09 Ammonia Injection Grid Leg #09
	Ball	Open	SCX-HV-541-10 Isolation Ammonia Injection Grid Leg #10
	Gate	Open	SCX-HV-540-10 Isolation Upstream SCX-DPI-1271-10 Ammonia Injection Grid Leg #10
	Gate	Open	SCX-HV-538-10 Isolation Downstream SCX-DPI-1271-10 Ammonia Injection Grid Leg #10
	Gate	Closed	SCX-HV-539-10 Isolation Equalizing SCX-DPI-1271-10 Ammonia Injection Grid Leg #10

Table 12 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Ball	Open	SCX-HV-541-11-Isolation Ammonia Injection Grid Leg #11
	Gate	Open	SCX-HV-540-11-Isolation Upstream SCX-DPI-1271-11 Ammonia Injection Grid #11
	Gate	Open	SCX-HV-538-11 Isolation Downstream SCX-DPI-1271-11 Ammonia Injection Grid Leg #11
	Gate	Closed	SCX-HV-539-11 Isolation Equalizing SCX-DPI-1271-11 Ammonia Injection Grid Leg #11
	Ball	Open	SCX-HV-541-12-Isolation Ammonia Injection Grid Leg #12
	Gate	Open	SCX-HV-540-12-Isolation Upstream SCX-DPI-1271-12 Ammonia Injection Grid #12
	Gate	Open	SCX-HV-538-12 Isolation Downstream SCX-DPI-1271-12 Ammonia Injection Grid Leg #12
	Gate	Closed	SCX-HV-539-12 Isolation Equalizing SCX-DPI-1271-12 Ammonia Injection Grid Leg #12
	Ball	Open	HV-546 Instrument Air Valve to PRV-502
	Ball	Open	HV-564 Blower Discharge Valve F-01A (closed if HV-565 is open)
	Ball	Closed	HV-565 Blower Discharge Valve F-01B (open if HV-564 is closed)
	Ball	Open	HV-547 Ammonia Inlet Manual Isolation to AFCU
	Ball	Open	HV-550 Ammonia Manual Isolation
	Ball	Open	HV-552 Ammonia Manual Isolation
	Ball	Open	HV-559 & 560 Ammonia Manual Isolation
END	**END**	**END**	**END**

Table 13 - System Pre-Start Up Valve Line Up

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
Ammonia Storage Tank/Vaporizer 1CI-AMM-0100			
	Gate	Closed	V92 – Vent Fill Connection
	Solenoid Operated	Closed	FV-101 - Control Flow Ammonia Tank Fill
	Relief	Not Gagged	PSV-107 - Relief Downstream FV-101
	Globe	Closed	V1 – Isolation Inboard Ammonia Tank Fill
	Relief	Not Gagged	PSV – 105 – Relief Downstream V1
	Globe	Closed	V2 – Isolation Inboard Ammonia Tank Fill
	Gate	Closed	V91 – Vent Vapor Return Connection
	Solenoid Operated	Closed	FV-102 – Control Flow Ammonia Vapor Return From Tank Fill
	Excess Flow	Open	V4 – Ammonia Vapor Return From Tank Fill
	Globe	Closed	V5 – Isolation Inboard Ammonia Vapor Return From Tank Fill
	Gate	Open	V21 – Isolation LT – 0296 Variable Leg Ammonia Tank Level
	Excess Flow	Open	V19 – Ammonia Reference Leg Ammonia Tank Level At Tank
	Angle	Open	V20 – Reference Leg Ammonia Tank Level
	Globe	Closed	V6 – Isolation Outboard Ammonia Vapor Return From Tank Fill

Table 13 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Excess Flow	Open	V11 – Excess Flow Valve To Vaporizer Loop
	Gate	Open	V7 – Isolation PI – 101
	Gate	Closed	Bleeder Vent at Tank Opening C-5
	3 – Way	Open	V9 – Isolation PSV – 101 & PSV – 102
	Relief	Not Gagged	PSV – 101 – Relief Ammonia Storage Tank
	Relief	Not Gagged	PSV – 102 – Relief Ammonia Storage Tank
	3 – Way	Open	V10 – Isolation PSV – 103 & PSV – 104
	Relief	Not Gagged	PSV – 103 – Relief Ammonia Storage Tank
	Relief	Not Gagged	PSV – 104 – Relief Ammonia Storage Tank
	Excess Flow	Open	V19 – Excess Flow Valve To LT – 0296
	Angle	Open	V12 – Tank to Vaporizer Loop
	Relief	Not Gagged	PSV – 106 – Relief Ammonia Tank To Vaporizers
	Gate	Open	V26A – Isolation Inlet Vaporizer A
	Gate	Closed	V22A – Drain Vaporizer A
	Gate	Open	V24A – Isolation PI – 201A
	Ball	Open	1IA-ISV-0109 Instrument Air to Ammonia Storage Skid

Table 13 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Relief	Not Gagged	PSV – 201A – Relief Vaporizer A Outlet
	Gate	Open	V27A – Isolation Outlet Vaporizer A
	Gate	Open	V26B – Isolation Inlet Vaporizer B
	Gate	Closed	V22B – Drain Vaporizer B
	Gate	Open	V24B – Isolation PI – 201B
	Relief	Not Gagged	PSV – 201B – Relief Vaporizer B Outlet
	Gate	Open	V27B – Isolation Outlet Vaporizer B
	Gate	Open	V13 – Isolation PT – 0295
	Globe	Open	V14 – Isolation Ammonia From Vaporizers To Tank
	Excess Flow	Auto	V15 – Excess Flow From Vaporizers To Tank
	Excess Flow	Auto	V16 – Excess Flow From Ammonia Tank To Process
	Angle	Open	V17 - Isolation Ammonia To Process
	Gate	Closed	V18 – Vent Drain Upstream PCV – 300
	Control	Auto	PCV – 300 – Pressure Control Out Ammonia Tank To Process
	Gate	Open	V25 – Isolation PI – 300 Pressure Out Ammonia Tank To Process

Table 13 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Gate	Open	1AM – ISV – 1100 Ammonia Isolation To HRSG 1100
	Gate	Open	1AM – ISV – 2100 Ammonia Isolation To HRSG 2100
	Gate	Closed	1AM – DRV – 0100 – Drain Ammonia Tank Containment
END	**END**	**END**	**END**

Table 14 - System Pre-Start Up Valve Line Up

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
SCR Ammonia Injection System (AFCU) – Train 2			
	Gate	Closed	1AM-DRV-2100-Drain/ Vent Upstream of Skid Inlet Valve 1AM-ISV-2101
	Ball	Open	1AM-ISV-2101-Isolation Ammonia To Train 2 SCR Skid (HV-547)
	Gate	Open	1AM-RTV-(Later)-Isolation 1AM-PI-2266 (HV-549)
	Ball	Open	1AM-ISV-2102-Isolation Inlet 1AM-XV-2157 (HV-550)
	Air Operated	Auto	1AM-XV-2157-Isolation Ammonia Inlet To Pressure Control Valve 1AM-PCV-2158
	Air Operated	Auto	1AM-PCV-2158-Pressure Control Ammonia To AIG
	Globe	Closed	1AM-BPV-2100-Bypass 1AM-XV-2157 & 1AM-PCV-2158 (HV-551)
	Ball	Open	1AM-ISV-2102-Isolation Outlet 1AM-XV-2158 (HV-552)
	Ball	Open	1AM-ISV-2104 Isolation Inlet 1AM-FV-2175 (HV-559)
	Air operated	Modulate	1AM-FV-2175 Ammonia Flow Rate Control
	Ball	Open	1AM-ISV-2105 Isolation Outlet 1AM-FV-2175 (HV-560)
	Ball	Open	1IA-ISV-(Later) Instrument Air to Ammonia Dilution Skid

Table 14 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Globe	Closed	1AM-BPV-2101 Bypass 1AM-FV-2175
	Butterfly	Open	1CA-ISV-2100 Isolation Blower F01A Discharge (HV-564)
	Butterfly	Open	1CA-ISV-2101 Isolation Blower F01B Discharge (HV-565)
	Gate	Open	SCX-HV-542 Isolation SCX-PI-1270 Grid Leg Ammonia Injection Manifold
	Gate	Closed	SCX-HV-543 Drain Grid Leg Ammonia Injection Manifold
	Ball	Open	SCX-HV-541-01 Isolation Ammonia Injection Grid Leg #1
	Gate	Open	SCX-HV-540-01 Isolation Upstream SCX-DPI-1271-01 Ammonia Injection Grid Leg #1
	Gate	Open	SCX-HV-538-01 Isolation Downstream SCX-DPI-1271-01 Ammonia Injection Grid Leg #1
	Gate	Closed	SCX-HV-539-01 Isolation Equalizing SCX-DPI-1271-01 Ammonia Injection Grid Leg #1
	Gate	Closed	SCX-HV-539-01 Isolation Equalizing SCX-DPI-1271-01 Ammonia Injection Grid Leg #3
	Ball	Open	SCX-HV-541-02 Isolation Ammonia Injection Grid Leg #2
	Gate	Open	SCX-HV-540-02 Isolation Upstream SCX-DPI-1271-02 Ammonia Injection Grid Leg #4
	Gate	Open	SCX-HV-538-02 Isolation Downstream SCX-DPI-1271-02 Ammonia Injection Grid Leg #4
	Gate	Closed	SCX-HV-539-02 Isolation Equalizing SCX-DPI-1271-02 Ammonia Injection Grid Leg #4
	Ball	Open	SCX-HV-541-03 Isolation Ammonia Injection Grid Leg #3
	Gate	Open	SCX-HV-540-03 Isolation Upstream SCX-DPI-1271-03 Ammonia Injection Grid Leg #5

Table 14 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Gate	Open	SCX-HV-538-03 Isolation Downstream SCX-DPI-1271-03 Ammonia Injection Grid Leg #5
	Gate	Closed	SCX-HV-539-03 Isolation Equalizing SCX-DPI-1271-03 Ammonia Injection Grid Leg #5
	Ball	Open	SCX-HV-541-04 Isolation Ammonia Injection Grid Leg #4
	Gate	Open	SCX-HV-540-04 Isolation Upstream SCX-DPI-1271-04 Ammonia Injection Grid Leg #6
	Gate	Open	SCX-HV-538-04 Isolation Downstream SCX-DPI-1271-04 Ammonia Injection Grid Leg #6
	Gate	Closed	SCX-HV-539-04 Isolation Equalizing SCX-DPI-1271-04 Ammonia Injection Grid Leg #6
	Ball	Open	SCX-HV-541-05 Isolation Ammonia Injection Grid Leg #5
	Gate	Open	SCX-HV-540-05 Isolation Upstream SCX-DPI-1271-05 Ammonia Injection Grid Leg #5
	Gate	Open	SCX-HV-538-05 Isolation Downstream SCX-DPI-1271-05 Ammonia Injection Grid Leg #5
	Gate	Closed	SCX-HV-539-05 Isolation Equalizing SCX-DPI-1271-05 Ammonia Injection Grid Leg #5
	Ball	Open	SCX-HV-541-06 Isolation Ammonia Injection Grid Leg #6
	Gate	Open	SCX-HV-540-06 Isolation Upstream SCX-DPI-1271-06 Ammonia Injection Grid Leg #6
	Gate	Open	SCX-HV-538-06 Isolation Downstream SCX-DPI-1271-06 Ammonia Injection Grid Leg #6
	Gate	Closed	SCX-HV-539-06 Isolation Equalizing SCX-DPI-1271-06 Ammonia Injection Grid Leg #6
	Ball	Open	SCX-HV-541-07 Isolation Ammonia Injection Grid Leg #7

Table 14 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed. If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g. auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Gate	Open	SCX-HV-540-07 Isolation Upstream SCX-DPI-1271-07 Ammonia Injection Grid Leg #7
	Gate	Open	SCX-HV-538-07 Isolation Downstream SCX-DPI-1271-07 Ammonia Injection Grid Leg #7
	Gate	Closed	SCX-HV-539-07 Isolation Equalizing SCX-DPI-1271-07 Ammonia Injection Grid Leg #7
	Ball	Open	SCX-HV-541-08 Isolation Ammonia Injection Grid Leg #08
	Gate	Open	SCX-HV-540-08 Isolation Upstream SCX-DPI-1271-08 Ammonia Injection Grid Leg #08
	Gate	Open	SCX-HV-538-08 Isolation Downstream SCX-DPI-1271-08 Ammonia Injection Grid Leg #08
	Gate	Closed	SCX-HV-539-08 Isolation Equalizing SCX-DPI-1271-08 Ammonia Injection Grid Leg #08
	Ball	Open	SCX-HV-541-09 Isolation Ammonia Injection Grid Leg #09
	Gate	Open	SCX-HV-540-09 Isolation Upstream SCX-DPI-1271-09 Ammonia Injection Grid Leg #09
	Gate	Open	SCX-HV-538-09 Isolation Downstream SCX-DPI-1271-09 Ammonia Injection Grid Leg #09
	Gate	Closed	SCX-HV-539-09 Isolation Equalizing SCX-DPI-1271-09 Ammonia Injection Grid Leg #09
	Ball	Open	SCX-HV-541-10 Isolation Ammonia Injection Grid Leg #10
	Gate	Open	SCX-HV-540-10 Isolation Upstream SCX-DPI-1271-10 Ammonia Injection Grid Leg #10
	Gate	Open	SCX-HV-538-10 Isolation Downstream SCX-DPI-1271-10 Ammonia Injection Grid Leg #10
	Gate	Closed	SCX-HV-539-10 Isolation Equalizing SCX-DPI-1271-10 Ammonia Injection Grid Leg #10

Table 14 - System Pre-Start Up Valve Line Up (cont)

Notice

The valve type will determine the required position. If it is a manual valve, the position will either be designated as open or closed If it is a Motor-Operated or Air-Operated valve, the position would reflect both the control status and the valve position (e.g auto open, auto closed, manual open, or manual closed.

Initials/ Check	Valve Type	Position	Valve Number/Nomenclature
	Ball	Open	SCX-HV-541-11-Isolation Ammonia Injection Grid Leg #11
	Gate	Open	SCX-HV-540-11-Isolation Upstream SCX-DPI-1271-11 Ammonia Injection Grid #11
	Gate	Open	SCX-HV-538-11 Isolation Downstream SCX-DPI-1271-11 Ammonia Injection Grid Leg #11
	Gate	Closed	SCX-HV-539-11 Isolation Equalizing SCX-DPI-1271-11 Ammonia Injection Grid Leg #11
	Ball	Open	SCX-HV-541-12-Isolation Ammonia Injection Grid Leg #12
	Gate	Open	SCX-HV-540-12-Isolation Upstream SCX-DPI-1271-12 Ammonia Injection Grid #12
	Gate	Open	SCX-HV-538-12 Isolation Downstream SCX-DPI-1271-12 Ammonia Injection Grid Leg #12
	Gate	Closed	SCX-HV-539-12 Isolation Equalizing SCX-DPI-1271-12 Ammonia Injection Grid Leg #12
	Ball	Open	HV-546 Instrument Air Valve to PRV-502
	Butterfly	Open	HV-564 Blower Discharge Valve F-01A (closed if HV-565 is open)
	Butterfly	Closed	HV-565 Blower Discharge Valve F-01B (open if HV-564 is closed)
	Ball	Open	HV-547 Ammonia Inlet Manual Isolation to AFCU
	Ball	Open	HV-550 Ammonia Manual Isolation
	Ball	Open	HV-552 Ammonia Manual Isolation
	Ball	Open	HV-559 & 560 Ammonia Manual Isolation
END	**END**	**END**	**END**

Ammonia Charging Procedures

Ammonia Charging Precautions and Limitations

Caution

Operating Limits: Never exceed the rated working pressure ratings of the storage tank or transfer hose during system recharge. The maximum allowable working pressure of the ammonia storage tank is 265 psi at 120 °F.

Do not overfill the storage tank. The tank should not be filled more than 85% full (10,000 gallons or 57,000 pounds). When filling the tank, the maximum liquid level can be checked by opening the small bleeder at valve V-7 (opening C-5); a small amount of liquid ammonia will vent from the bleeder valve when the 85% level is reached. Check the level before and during the ammonia charging operation to ensure that 85% level is not exceeded.

Consequences of Deviations: Over-pressuring the storage tank or transfer hose can cause the equipment to rupture or relief valves to lift resulting in release of ammonia. This may damage equipment and cause injury to workers due to sudden release of pressure and/or exposure to ammonia.

Improper hose connections or use of defective hoses can result in ammonia leaks. This can expose workers to sudden release of pressure and/or exposure to ammonia liquid and/or vapor.

Overfilling the ammonia storage tank can result in inefficient operation of the system and possible damage to equipment.

Actions to Correct Deviations: The ammonia charging process should be monitored closely for unsafe conditions. In case of over-pressurization or leakage, stop the ammonia transfer process and isolate the leak by closing the appropriate valves.

Special Precautions: There is always a possibility of exposure to ammonia during recharge operations due to leaks that can occur. Personnel assisting or observing unloading must always wear proper PPE (gloves, boots, face shields) while performing the transfers and while connecting and disconnecting lines.

In case of an ammonia release, stop the ammonia transfer process and isolate the leak by closing appropriate valves if you can do so safely Notify the Maintenance Manager and anyone who may be in danger of exposure. Only properly trained and equipped persons are authorized to respond to ammonia releases.

Always use the buddy system and follow lock-out/tag-out, confined space entry, and equipment isolation and evacuation procedures.

Table 15 - Unloading Prerequisites

Step Number	Step
1.	Before any connections are made, verify that the system can hold the amount of ammonia being delivered.
2.	Before any connections are made, verify that the safety shower and eyewash in the area are operational.
3.	Before any connections are made, verify that the delivery truck wheels are chocked and the hand brake is applied.
4.	Verify that the ammonia is anhydrous.
5.	The supplier will locate the vehicle in a safe location as close to the transfer point as is possible. The employee supervising this operation will monitor this operation to ensure that no damage occurs to the facility or vehicle and that all safety steps are followed.
6.	Place safety barricades or cones around the delivery truck.
7.	All WCE personnel assisting in the delivery will wear appropriate PPE (boots, gloves and face shield).
8.	Close all tank block valves so that the tank is isolated from the vaporizers and the process.
9.	Open the bleeder valves at the liquid and vapor valves on the supplier's truck hose end as well as the bleeder valves at the storage tank loading station liquid and vapor shutoff valves. Stand upwind when opening the bleeder valves.
10.	Remove the protective line caps from the truck hose and from the storage tank loading station only when no pressure exists behind the caps.
11.	Open all vaporizer block valves.
12.	Open the level transmitter block valve (V21)
13.	Open root valves V7 (PI-101), V13 (PT-0295), and V24B (PI-201B).
14.	Open tank fill block valve V2 and vapor return tank block valve V5.

15.	Open fill and return line stop valves FV-101 and FV-102.
16.	Open and close loading bulkhead bleed valves V93 and V94.
17.	After all connections have been made, close the bleeder valves.
18.	Connect fill hoses to fill and return fittings on the loading bulkhead. Check the hoses for visible signs of weakness, such as cracks, splits, or bulges.
19.	Open the loading bulkhead valves in this order: V6, V1.
20.	Slightly open the liquid valve at the tank to allow ammonia to fill the space. If no leaks are detected, open the vapor valve at the receiving tank to allow pressure to equalize.
21.	Open the liquid and vapor internal valves.
22.	The supplier will start the engine, adjust the RMP to ensure the proper flow of ammonia through the delivery pump, and start the pump to fill the tank.
23.	The filling rate should be maintained below approximately 200 gpm. Tank filling rate should be reduced significantly when the tank has reached 80% capacity as indicated by the tank level gauge, LI-100.
24.	Monitor the hoses and connections throughout the charging process for leaks.
25.	STOP the tank filling at the first sign of ammonia liquid released from the bleeder vent at opening C5, or when the tank has reached 85% of capacity as indicated by the tank level gauge LI-100.
26.	After ammonia filling has been completed, close the loading bulkhead valves in this order: V1, V6. Then disengage the connections in reverse order of the above connection steps. WCE employees are responsible for rechecking valves after disconnection to ensure they are properly closed.
27.	Sign appropriate delivery documents and remove safety barricades.
28.	Log the transfer information on the ammonia system daily rounds. This information includes the date, amount, and sight glass level. If a specific event is the cause for the recharge, record this information also.
END	**END**

Ammonia Vaporizers

Ammonia Vaporizers Precautions and Limitations

Caution

Operating Limits: Never exceed the rated working pressure ratings of the vaporizers. The maximum allowable working pressure of the ammonia vaporizers is 265 psi at 160 °F The vaporizers are rated for 108kW, 480 Volt, 3 phase.

Consequences of Deviations: Over-pressuring the vaporizers can cause the equipment to rupture or relief valves to lift resulting in release of ammonia. This may damage equipment and cause injury to workers due to sudden release of pressure and/or exposure to ammonia.

Normal operation of the vaporizers is designed to maintain tank pressure during periods of cold weather y heating and vaporizing liquid ammonia. An over temperature switch shuts off power to the heater elements when the operating temperature of the vaporizer exceeds 300 °F. System operators must be aware of the safe operating range and adhere to it in all modes of operation.

Both vaporizers must be kept flooded with liquid ammonia to prevent overheating of the elements when activated. Therefore, block valves upstream and downstream of both vaporizers must be open.

Actions to Correct Deviations: Deviations above the maximum allowable pressure are dangerous and can cause failure of the equipment, which can result in injury or death due to sudden release of pressure and anhydrous ammonia. The vaporizers are equipped with high pressure and high temperature switches as well as pressure relief valves to prevent this from occurring. Shut the system down immediately and notify the Maintenance Manager if this occurs.

Special Precautions: The SCR system is equipped with high pressure and high temperature cutouts as well as relief valves to protect the vaporizers from over-pressurization.

When working on the ammonia system equipment during maintenance or repairs, always use the buddy system and follow lock-out/tag-out, confined space entry, and equipment isolation and evacuation procedures.

The vaporizer skid contains two 108 kW vaporizers. One vaporizer is active, and the other vaporizer is in standby, such that they can be automatically cycled on and off

Vaporizer selection can be made from the control panel, and the vaporizers may be turned on or off remotely or at the skid. At the skid, using HS-201A or HS-201B to activate the desired vaporizer.

The online vaporizer maintains ammonia tank pressure during periods of cold weather by heating and vaporizing liquid ammonia. Liquid NH_3 flows by gravity from the storage tank to the vaporizer. The vaporizers are located below the tank so that the heater elements are always flooded; all block valves upstream and downstream of both vaporizers must be open. Ammonia gas produced by the vaporizer is returned to the tank vapor space.

A pressure transmitter on the storage tank (PT-0295) provides the process input to the pressure indicating controller (PIC-0295), which controls the current input to the vaporizer heating elements. An over temperature switch shuts off the power to the heater elements when the operating temperature exceeds 300 °F. Tank pressure and vaporizer over temperature alarm signals are sent to the DCS.

Ice build-up on certain components of the ammonia SCR equipment may be indicative of damage to the vapor seals of the insulation. Such ice buildup should be reported to the Maintenance Manager, and ice should be removed. Be careful not to damage equipment when removing ice. Never strike the equipment when attempting to remove ice, but rather, use warm water or warm air to remove ice buildup from ammonia equipment.

Ammonia/Air Flow Control Unit Procedures

Ammonia/Air Flow Control Unit Precautions and Limitations

Caution

Operating Limits: Never exceed the rated working pressure ratings of the storage tank or transfer hose during system recharge. The maximum allowable working pressure of the ammonia storage tank is 265 psi at 120 °F.

Do not overfill the storage tank. The tank should not be filled more than 85% full (10,000 gallons or 57,000 pounds). When filling the tank, the maximum liquid level can be checked by opening the small bleeder at valve V-7 (opening C-5); a small amount of liquid ammonia will vent from the bleeder valve when the 85% level is reached. Check the level before and during the ammonia charging operation to ensure that 85% level is not exceeded.

Consequences of Deviations: Over-pressuring the storage tank or transfer hose can cause the equipment to rupture or relief valves to lift resulting in release of ammonia. This may damage equipment and cause injury to workers due to sudden release of pressure and/or exposure to ammonia.

Improper hose connections or use of defective hoses can result in ammonia leaks. This can expose workers to sudden release of pressure and/or exposure to ammonia liquid and/or vapor.

Overfilling the ammonia storage tank can result in inefficient operation of the system and possible damage to equipment.

Actions to Correct Deviations: The ammonia charging process should be monitored closely for unsafe conditions. In case of over-pressurization or leakage, stop the ammonia transfer process and isolate the leak by closing the appropriate valves.

Special Precautions: There is always a possibility of exposure to ammonia during recharge operations due to leaks that can occur. Personnel assisting or observing unloading must always wear proper PPE (gloves, boots, face shields) while performing the transfers and while connecting and disconnecting lines.

In case of an ammonia release, stop the ammonia transfer process and isolate the leak by closing appropriate valves if you can do so safely. Notify the Maintenance Manager and anyone who may be in danger of exposure. Only properly trained and equipped persons are authorized to respond to ammonia releases.

Always use the buddy system and follow lock-out/tag-out, confined space entry, and equipment isolation and evacuation procedures.

Table 16 - Start Up Prerequisites

Step Number	Step
1.	Close all circuit breakers at the control panel.
2.	At the DCS, the system should indicate alarms such as: "Low Instrument Air Pressure, Low NH_3 Vapor Pressure, Low NH_3 Vapor Flow, and Low Dilution Air Flow."
3.	Open the instrument air valve (HV-546) and set the air pressure at regulator PRV-502 to 20 psig.
4.	The system should be in the "System Stop" mode. At this time, check that the 1/8" diameter flex tubing at each orifice flange tab have been installed and the block valves at each manifold subheader are open.
5.	Open the manual air valves HV-564 **or** HV-565.
6.	Close the ammonia manual valve HV-547.
7.	At the DCS, select blower A or B; the selected blower will start. Check and adjust the position of the main air flow valves of the selected blower (HV-564 **or** HV-565) to obtain "Normal Process Air" flow rate at FIT-1178 of 333 scfm at 5.77 inches of H_2O.
8.	In the "Blower Running" mode, only air is being injected into the flue gas stream. If an "Air Flow Low" alarm occurs, the system will not be able to switch from the "Ready to Inject" to "Injecting" mode; hence no ammonia can be injected.
9.	With the normal air flow, all equipment on the ammonia skid should be checked for air leaks, at flanges, connections and fittings, and corrected if any are found. If none are found, the system may be shutdown by pushing the "Emergency Stop" button. The air portion of the system is now ready for operation.
END	**END**

Table 17 - System Blower Skid Start Up Prerequisites

Step Number	Step
1.	Before starting the blower skids, check that the liquid ammonia storage/vaporizer system is operating and open to the ammonia system skids. This can be achieved by opening manual valves HV-547, HV-550, HV-552, HV-559, and HV-560.
2.	At the blower skid control panel, turn on the main circuit breaker CB-1.
3.	Be sure to pull out the "Emergency Stop" pushbutton HS-1135.
4.	From the blower selector switch in the DCS, start blower F-01A or F-01B and verify that the selected blower is running at the DCS.
5.	From the DCS, verify that the air flow is in the NORMAL flow position. This will have been verified by adjusting manual valve HV-564 (or HV-565) until flow transmitter FIT-1178 registers 5.77 inches H_2O pressure or 333 scfm.
6.	From the DCS, energize the solenoid valve XY-1157. This will start the ammonia injection by opening flow valve XV-1157.
END	**END**

Table 18 - Ammonia Gas Injection Run Prerequisites

Step Number	Step
1.	Manual Operation: From the DCS, manual or auto-operating modes can be selected. The ammonia flow in pounds per hour can be dialed for a selected flow. This is the manual mode of operation. In this mode, the flow of ammonia will remain the same even though other control signals vary, including the NO_x tracking signal.
2.	Automatic Operation: When in automatic mode, the ammonia flow will follow the setpoint set in the DCS system. The ammonia flow control valve FV-1175 will open and close to follow the 4-20 mA NO_x tracking signal received from the DCS system.
END	**END**

Table 19 - Instrument and Control Settings

Step Number	Step
1.	Blower skid instrument air low pressure switch PSL-1134 set to 60 psig activates alarm at the DCS.
2.	Main process air valves HV-564 and HV-565 set to normal air flow (333 scfm at 5.77 inches H_2O pressure) as read at the DCS from the 420 mA signal from the air flow transmitter FIT-1178.
3.	Ammonia vapor pressure control valve PVC-1158 set to 10 psi.
4.	Ammonia vapor pressure transmitter PIT-1173 range of 0 - 30 psig corresponds to a linear 4-20 mA signal to the DCS for ammonia vapor pressure.
5.	Ammonia vapor temperature transmitter TT-1174 range of 0 - 257°F corresponds to a linear 4-20 mA signal to the DCS for ammonia vapor temperature.
6.	Ammonia vapor flow transmitter FIT-1175 range of 0 – 30 inches H2O pressure corresponds to a linear 4-20 mA signal to the DCS for ammonia vapor flow.
END	**END**

Table 20 - Normal Shutdown

Step Number	Step
1	Turn off the selected blower from the DCS system after which the following events will occur:
2.	The selected blower will stop.
3.	The DCS system will receive a dry contact signal that the blower is off.
4.	The DCS system will receive the air flow signal "go to zero air flow."
5.	The ammonia flow valve XV-1157 will close via solenoid XY-1157.
6.	The ammonia pressure transmitter PIT-502 will send a signal to the DCS system of zero pressure.
7.	The ammonia flow transmitter FIT-1175 will send a signal to the DCS system of zero ammonia flow.
8.	The DCS system will then close the ammonia flow control valve FV-1175.

9.	For long term shutdown, turn off the main circuit breaker CB-1.
END	**END**

Table 21 - Emergency Shutdown

Step Number	Step
1.	An "Emergency Stop" pushbutton HS-1135 is provided on the blower skid control panel to shutdown the system ONLY under true emergency conditions. When pressed, the same events will occur that occurred under Normal Shutdown (above). The DCS system will receive a signal that the "Emergency Stop" pushbutton has been pushed.
2.	The system should be restarted as soon as possible and put into at least the "Blower Running" mode.
END	**END**

Table 22 - Routine Inspections

Step Number	Step
1.	Flanges and Gaskets: Should disassembly of any part of the manifolding or ducting be required, only standard machine shop practices are needed: a. Use special care to avoid damaging flange faces. b. Remove all burrs that would interface with a good seal. c. When reinstalling, align faces carefully, and torque uniformly. d. Use a good quality high temperature gasket material.
2.	Air Blowers: Check the belt tension periodically.
3	Ammonia Injection Grids: The stainless steel probes should require no routine maintenance. However, during boiler outages, a shutdown inspection should be made for any corrosion at the injection orifices, and the probes should be cleaned or blown out with high pressure plant air.
4.	Lamp Bulbs: Replace burned out lamp bulbs as necessary.
5.	Air Blower Inlet Filters: Clean air blower inlet filters weekly.
6.	Annunciator Lamp Bulbs: Check annunciator lamp bulbs monthly.

7.	Interlocks and Alarms: Test interlocks and alarms for proper actuation every six months.
END	**END**

Operating Procedure

Hazardous Chemical Deliveries and Transfers

Prepared By: *Operations Manager*	**Name: Chad Harrison**	Date: 10-31-07
Reviewed By: *EHS Manager*	**Name: David Argyros**	Date: 10-31-07
Approved By: *Facility Manager*	**Name: Thomas Fallon**	Date: 10-31-07

1.0 - PURPOSE

This Operating Procedure describes the steps and associated information required to safely perform Hazardous Chemical Unloading under normal conditions.

2.0 - SYSTEM DESCRIPTION

2.1 - General

This procedure interacts with many systems.

93% Sulfuric Acid and 50% Sodium Hydroxide are stored in 6000 gallon bulk tanks in the demineralizer building. Acid and Caustic are used during Demineralizer regenerations. Acid is also used for pH control in the cooling tower.

15% Sodium Hypochlorite (Bleach) is used for Bio-Control in the Cooling Tower. It is delivered in bulk by tank truck to our 5000-gallon bulk tank. It is necessary to receive partial deliveries of Sodium Hypochlorite because the product degrades over time.

Anhydrous Ammonia is used in the HRSG's Selective Catalytic Reduction System. The site typically uses "Met Grade" or Metallurgical Grade Anhydrous Ammonia. Following a full tank clean out the site will refill with Commercial Grade Ammonia to ensure a protective layer of water is present. Consult with the Ops Manager if there are questions. There are two 2000-gallon (water volume) tanks; each is completely separate from the other. Ammonia deliveries are received in Bulk from a tank truck.

GE Betz provides BL5400 Scale Inhibitor "DeposiTrol" for use in the cooling tower. Totes are used with two 100% pumps for delivery. When a tote is low it gets topped off by bringing another tote to the area with the forklift and raising it in the air to allow the product to gravity flow into the tank being topped off.

GE Betz provides HP3100 Phosphate "OptiSperse" for use in the HRSG steam and water cycle. Totes are used with different pumps for delivery to either the HP or IP Drums. When a tote is low it gets topped off by bringing another tote to the area with the forklift, and raising it in the air to allow the product to gravity flow into the tank being topped off.

GE Betz provides CT5607 Oxygen Scavenger "CORTROL" for use in the HRSG steam and water cycle. Totes are used with two pumps for delivery to the condensate system. When a tote is low it gets topped off by bringing another tote to the area with the forklift; and raising it in the air to allow the product to gravity flow into the tank being topped off.

GE Betz provides NA1321 Aqua Ammonia "SteamMate" for use in the HRSG steam and water cycle. Totes are used with two pumps for delivery to the condensate system. When a tote is low it gets topped off by bringing another tote to the area with the forklift, and raising it in the air to allow the product to gravity flow into the tank being topped off.

GE Betz provides Sodium BiSulfite DT1404 “Spectrus” for use as a chlorine scavenger. It is injected into the raw water being fed to the demineralizer trains.

GE Betz provides Sulfite called CORTROL IS100 as an Oxygen Scavenger for the auxiliary boiler. It comes in a barrel as a powder and is mixed as needed in the auxiliary boiler chemical tank.

GE Betz provides Phosphate called Optiguard MCP600 for the auxiliary boiler. It comes in jugs as a liquid and is mixed as needed in the auxiliary boiler chemical tank.

GE Betz provides Corrshield MD4100 for use as a corrosion inhibitor in the closed cooling water system. The primary ingredients are Sodium Molybdate and Sodium Nitrite.

3.0 – REFERENCES

3.1 - Reference Documents

1.1.1	GE Global O&M Services Environment, Health and Safety Manual	
1.1.2	MSDS – 15% Sodium Hypochlorite	
1.1.3	MSDS – 93 % Sulfuric Acid	
1.1.4	MSDS – Metallurgical and Commercial Grade Anhydrous Ammonia	
1.1.5	MSDS –Scale Inhibitor GE Betz BL5400	
1.1.6	MSDS –HRSG Phosphate GE Betz HP3100	
1.1.7	MSDS –HRSG Oxygen Scavenger GE Betz OS5607	
1.1.8	MSDS – HRSG Aqua Ammonia GE Betz NA1321	
1.1.9	MSDS – 50% Sodium Hydroxide (Caustic)	
1.1.10	Foster Wheeler Selective Catalytic Reduction System	42702-24501-874-1
1.1.11	Wahlco Anhydrous Ammonia Storage System O&M Manual	42702-24707-28-1

3.2 - Reference Drawings

1.1.12	Chemical Injection System P&ID	1-PD-4-CI.0-1 to CI.2-2
1.1.13	Demineralized Water System	1-PD-4-DW.0-1

4.0 - SPECIAL TOOLS/EQUIPMENT

The following tools and equipment should be staged prior to performing this operating procedure:

- Personal Protective Equipment will be covered in detail in each chemical specific procedure.
- Copy of Operating Procedure
- Flashlight (if applicable)
- Radio

5.0 – GENERAL NOTES

Notice

Actions to be taken by the operator are printed as **CAPITALIZED AND BOLD**.

Automatic actions taken by the control system are printed as ***bold and italic***.

5.1 - Safety Symbol Legend

In the Operating Instructions the following standard format is used:

Warning

Commands attention to an operating procedure, practice, condition or statement, which, if not strictly observed, could result in personal injury or death.

Caution

Commands attention to an operating procedure, practice, condition or statement, which, if not strictly observed, could result in damage to, or destruction of equipment.

Notice

Commands attention to an essential operating or maintenance procedure, condition or statement that must be highlighted.

6.0 - GENERAL PRECAUTIONS

Definition

Bulk Delivery – A delivery of hazardous material in a container (including a transport vehicle or freight container) with an internal volume greater than119 gallons of liquid, greater than 882 pounds of solid, or a water capacity greater than 1000 pounds for gas.

Caution

Particular attention should be given to normal operating conditions of the system, its equipment, and components to detect variations from their normal conditions and function. **Abnormal conditions, alarms or malfunctions are to be investigated and corrected as soon as possible**.

Caution

All shipments of hazardous materials must be properly labeled in accordance with government rules. An MSDS and the appropriate shipping papers must accompany all shipments of hazardous materials.

Caution

Cell Phones shall not be used in delivery areas.

Caution

Verify the hazardous material has been approved for use at this facility via the site's material approval process.

Caution

Verify the content and quantity of the hazardous materials listed on the shipping paper match what is being delivered.

Caution

Verify the integrity of the vehicles transporting hazardous materials as leaking vehicles will not be permitted on site.

Warning

During tote transfer operations ensure that two people have verified the labels on both totes. The label on the tote used for topping off must match the label on the tote that is in place. No exceptions without Operations Manager's Approval.

DELIVERY PROCEDURES

7.1 –Sodium Hypochlorite (NaOCl Bleach) Bulk Delivery

Table 1 Sodium Hypochlorite Delivery Prerequisites

Initials		STEP
		REVIEW the Sodium Hypochlorite MSDS **Record Delivery Date**: _____
		Bulk Delivery Drivers must check in at the Control Room upon arrival at the facility. The facility escort shall verify that the tank has the necessary capacity to receive the shipment being delivered. If for any reason a clear determination of the tank level cannot be made, the shipment **MUST NOT** be accepted.
Initials #1	Initials #2	**REVIEW** the "**Bill of Lading**" and "**Certificate of Analysis**" to ensure the proper chemical is delivered. This requires two separate signatures for review. **The product transfer is not permitted to take place without two sets of initials.**
		Inspect use portion of system for: • Calibration column fill valves are closed. • Piping is secure/intact and not leaking. • Containment (if applicable) is clean and free of contaminants, water or debris. • Doors or exhaust fans are open to allow for proper ventilation.
		Inspect receiving tank for: • No water/debris in secondary containment • Tank/piping integrity - No visible leaks or signs of deterioration.
		VERIFY Proper operation of applicable safety showers/eyewash stations.
		VERIFY Spill kit is available and has applicable supplies: • Speedi-dry or similar • Lime or similar neutralizer • Squeegee • 5 gal bucket for hose breaking • Shovel • Sorbent materials

Table 2 Required PPE

Initials	STEP
	Acid Suit, PVC Gloves, Acid Resistant Boots, Face Shield with Safety Glasses and Hard Hat.

Table 3 Sodium Hypochlorite Delivery

Initials	STEP
	ESTABLISH communications with the control room
	DIRECT the tank truck to the unloading station and position for off-loading. The vehicle hand break must be set and the wheels chocked. The truck engine shall be turned off during the unloading unless the use of the engine is required to operate the transfer pump.
	VERIFY Proper PPE worn by driver and any other escorts as described in **table 2**.
	BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
	Inspect receiving tank for: • Capacity • No water/debris in secondary containment • Tank/piping integrity - No visible leaks or signs of deterioration.
	Before connecting the delivery lines to the unloading truck, **INSPECT** for kinks, cuts, abrasions, and general wear.
	INSPECT Delivery line fittings for wear and integrity of seal. Ensure that fittings are appropriate for the material to be pumped.
	DISCUSS with driver how to shutdown the unloading pump in the event of an emergency.
	Place a clean dry 5 gallon plastic bucket under the off-loading connection.
	Open unloading cap and instruct driver to connect the hose from the tanker to the fill line.
	After the delivery lines are connected and secured, **VERIFY** that all cam locks are tied down, all connections shall be inspected.
	Before the unloading pump is started, **OPEN** the delivery valves and check connections for leakage. Close valves and realign connections as necessary until there are no leaks.

	Step clear of the barricade and **INFORM** the control room that unloading is about to begin.
	INSTRUCT Driver to begin unloading. Monitor the actions of the driver and assist only in case of an emergency. Facility escort must be present at all times.
	During the unloading periodically: • Check the delivery vehicle for leaks • Check for leaks in the unloading hoses and connections, pumps • Check for leaks in the receiving tank/tote • Check for leaks in the use portion of the system by walking through the area and visually checking pumps, piping, valves, Cal columns, dikes etc.
	After the product has been transferred, **VERIFY** that the delivery valves are shut and the unloading hose is purged to remove all liquids.
	SHUT delivery valves, and record final level: _____
	INSTRUCT Driver to disconnect delivery hose; any drips or residual must be directed to containment or drip pans.
	When the driver is finished storing the hose, PPE may be removed.
	REMOVE Wheel chocks.
	NOTIFY the Control Room that the chemical delivery is complete.
	SIGN the shipping paperwork and release the truck.
	REMOVE and STORE barricade. Clean up any danger tape that was used.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
	Receiving paperwork will be delivered to the Ops Manager. This includes the original procedure with initials for each step. Any problems should be noted on the procedure, i.e. “no wheel chocks on site- new ones are needed”

7.2 – Sulfuric Acid (H_2SO_4) Bulk Delivery

Table 1 Sulfuric Acid Delivery Prerequisites

Initials		STEP
		REVIEW the Sulfuric Acid MSDS **Record Delivery Date**: _____
		Bulk Delivery Drivers must check in at the Control Room upon arrival at the facility. The facility escort shall verify that the tank has the necessary capacity to receive the shipment being delivered. If for any reason a clear determination of the tank level cannot be made, the shipment **MUST NOT** be accepted.
		Inspect use portion of system for: • Calibration column fill valves are closed. • Piping is secure/intact and not leaking. • Containment (if applicable) is clean and free of contaminants, water or debris. • Doors or exhaust fans are open to allow for proper ventilation.
		Inspect receiving tank for: • No water/debris in secondary containment • Tank/piping integrity - No visible leaks or signs of deterioration.
Initials #1	Initials #2	**REVIEW** the "**Bill of Lading**" and "**Certificate of Analysis**" to ensure the proper chemical is delivered. (**93% Sulfuric Acid**). This requires two separate signatures for review. **The product transfer is not permitted to take place without two sets of initials.**
		VERIFY Proper operation of applicable safety showers/eyewash stations. Show all personnel involved the location of said safety showers/eyewash stations. Keep overhead door closest to eye wash open and ensure path of travel is free from obstructions.
		VERIFY that (If using plant air to pressurize tank to off-load) you free blow airline for 30 seconds to remove any water or oil. Do not use plant air without consulting with the Operations Manager. If plant air does not use a proper regulator over-pressure of the truck could occur.
		Verify that the pump supplied by the vendor operates safely and is good repair and that the driver knows how to operate the pump. **Note:** The driver may not use a pump and might use pressurized air instead supplied from the Truck.
		VERIFY Spill kit is available and has applicable supplies: • Speedi-dry or similar

	• Lime or similar neutralizer • Squeegee • 5 gal bucket for hose breaking • Shovel • Sorbent materials

Table 2 Required PPE

Initials	STEP
	Acid Suit, PVC Gloves, Acid Resistant Boots, Face Shield with Safety Glasses and Hard Hat.

Table 3 Sulfuric Acid Delivery

Initials	STEP
	ESTABLISH communications with the control room
	DIRECT the tank truck to the unloading station and position for off-loading. The vehicle hand break must be set and the wheels chocked. The truck engine shall be turned off during the unloading unless the use of the engine is required to operate the transfer pump.
	VERIFY Proper PPE worn by driver and any other escorts as described in **Table 2**.
	BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
	Test high level tank alarm, red light will illuminate (this only tests the circuit, no audible alarm is heard) Check and record initial tank level: _____
	Before connecting the delivery lines to the unloading truck, **INSPECT** for kinks, cuts, abrasions, and general wear.
	INSPECT Delivery line fittings for wear and integrity of seal and compatibility with chemical to be received.
	DISCUSS with driver how to shutdown the unloading pump in the event of an emergency.
	Place a clean dry 5 gallon plastic bucket under the off-loading connection.
	Remove unloading cap and instruct driver to connect the hose from the tanker to the fill line.
	After the delivery lines are connected and secured, **VERIFY** that all cam locks are tied down, all connections shall be inspected.

	Before the unloading pump is started (or tanker is pressurized), **OPEN** the delivery valves and check connections for leakage. If a leak occurs, close valves and realign connections as necessary until there are no leaks. If leaks persists secure the operation until all leaks are controlled.
	Step clear of the barricade and **INFORM** the control room that unloading is about to begin.
CAUTION	This tank has an oil loop seal; if product is pumped too fast the oil will be pushed out of the loop and into the dike. Check the base of the gray PVC pipe for any leakage; oil leaking out is a sign of pumping too fast.
	INSTRUCT Driver to begin unloading. Monitor the actions of the driver and assist only in case of an emergency. Facility escort must be present at all times.
	During the unloading periodically: • Check the delivery vehicle for leaks • Check for leaks in the unloading hoses and connections, pumps • Check for leaks in the receiving tank/tote • Check for leaks in the use portion of the system by walking through the area and visually checking pumps, piping, valves, Cal columns, dikes etc.
	After the product has been transferred, **VERIFY** that the delivery valves are shut and the unloading hose is purged to remove all liquids.
	SHUT delivery valves, and record final level: _____
	INSTRUCT Driver to disconnect delivery hose, and re-install cap, any drips or residual must be directed to containment or collection device.
	When the driver is finished storing the hose, PPE may be removed.
	REMOVE Wheel chocks**. Re-verify** that all hoses are disconnected and that all valves are closed.
	NOTIFY the Control Room that the chemical delivery is complete and the quantity received.
	SIGN the shipping paperwork and release the truck.
	REMOVE and STORE barricade.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
	Receiving paperwork will be delivered to the Ops Manager. This includes the original procedure with initials for each step. Any problems should be noted on the procedure, i.e. “no wheel chocks on site- new ones are needed”

7.3 – Caustic (Sodium Hydroxide (NaOH)) Bulk Delivery

Table 1 Caustic Delivery Prerequisites

Initials		STEP
		REVIEW the 50% Caustic MSDS **Record Delivery Date**: _____
		Bulk Delivery Drivers must check in at the Control Room upon arrival at the facility. The facility escort shall verify that the tank has the necessary capacity to receive the shipment being delivered. If for any reason a clear determination of the tank level cannot be made, the shipment **MUST NOT** be accepted.
		Inspect use portion of system for: • Calibration column fill valves are closed. • Piping is secure/intact and not leaking. • Containment (if applicable) is clean and free of contaminants, water or debris. • Doors or exhaust fans are open to allow for proper ventilation.
		Inspect receiving tank for: • No water/debris in secondary containment • Tank/piping integrity - No visible leaks or signs of deterioration.
Initials #1	Initials #2	**REVIEW** the "**Bill of Lading**" and "**Certificate of Analysis**" to ensure the proper chemical is delivered. (**50% Membrane Sodium Hydroxide** a.k.a. Caustic). This requires two separate signatures for review. **The product transfer is not permitted to take place without two sets of initials.**
		VERIFY Proper operation of applicable safety showers/eyewash stations. Show all personnel involved the location of said safety showers/eyewash stations. Keep overhead door closest to eye wash open and ensure path of travel is free from obstructions.
		VERIFY that if using air to pressurize tank to off-load, free blow airline for 30 seconds to remove any water or oil.
		Verify that the pump supplied by the vendor operates safely and is good repair and that the driver knows how to operate the pump.
		VERIFY Spill kit is available and has applicable supplies: • Speedi-dry or similar • Squeegee • 5 gal bucket for hose breaking • Shovel • Sorbent materials

Table 2 Required PPE

Initials	STEP
	Acid Suit or yellow Tyvek, PVC Gloves, Chemical Resistant Boots, Face Shield with Safety Glasses and Hard Hat.

Table 3 Caustic Delivery

Initials	STEP
	ESTABLISH communications with the control room
	DIRECT the tank truck to the unloading station and position for off-loading. The vehicle hand break must be set and the wheels chocked. The truck engine shall be turned off during the unloading unless the use of the engine is required to operate the transfer pump.
	VERIFY Proper PPE worn by driver and any other escorts as described in **Table 2**.
	BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
	Test high level tank alarm, red light will illuminate (this only tests the circuit, no audible alarm is heard) Check and record initial tank level: _____
	Before connecting the delivery lines to the unloading truck, **INSPECT** for kinks, cuts, abrasions, and general wear.
	INSPECT Delivery line fittings for wear and integrity of seal and compatibility with chemical to be received.
	DISCUSS with driver how to shutdown the unloading pump in the event of an emergency.
	Place a clean dry 5 gallon plastic bucket under the off-loading connection.
	Remove unloading cap and instruct driver to connect the hose from the tanker to the fill line.
	After the delivery lines are connected and secured, **VERIFY** that all cam locks are tied down, all connections shall be inspected.
	Before the unloading pump is started, **OPEN** the delivery valves and check connections for leakage. If a leak occurs, close valves and realign connections as necessary until there are no leaks. If leaks persists secure the operation until all leaks are controlled.
	Step clear of the barricade and **INFORM** the control room that unloading is about to begin.

	INSTRUCT Driver to begin unloading. Monitor the actions of the driver and assist only in case of an emergency. Facility escort must be present at all times.
	During the unloading periodically: • Check the delivery vehicle for leaks • Check for leaks in the unloading hoses and connections, pumps • Check for leaks in the receiving tank/tote • Check for leaks in the use portion of the system by walking through the area and visually checking pumps, piping, valves, Cal columns, dikes etc.
	After the product has been transferred, **VERIFY** that the delivery valves are shut and the unloading hose is purged to remove all liquids.
	SHUT delivery valves, and record final level: _____
	INSTRUCT Driver to disconnect delivery hose, and re-install cap, any drips or residual must be directed to containment or collection device.
	When the driver is finished storing the hose, PPE may be removed.
	REMOVE Wheel chocks**. Re-verify** that all hoses are disconnected and that all valves are closed.
	NOTIFY the Control Room that the chemical delivery is complete and the quantity received.
	SIGN the shipping paperwork and release the truck.
	REMOVE and STORE barricade. Clean up and danger/caution tape that was used.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
	Receiving paperwork will be delivered to the Ops Manager. This includes the original procedure with initials for each step. Any problems should be noted on the procedure, i.e. “no wheel chocks on site- new ones are needed”

7.4 – Anhydrous Ammonia (NH3) Bulk Delivery

Table 1 Anhydrous Ammonia Delivery Prerequisites

Initials		STEP
		REVIEW the Anhydrous Ammonia **MSDS** **Record Delivery Date**: _____
Initials #1	Initials #2	**REVIEW** the **"Bill of Lading"** and "**Certificate of Analysis**" to ensure the proper chemical is delivered. **Metallurgical Grade Ammonia is the Standard Delivery**. If Commercial Grade is delivered make sure the Operations Manager is aware of this prior to unloading. This requires two separate signatures for review. **The product transfer is not permitted to take place without two sets of initials.**
		VERIFY Proper **operation** of applicable safety **showers/eyewash stations.**
		RECORD initial level of each tank prior to commencing transfer. **Tank #1**_____ **Tank #2** _____
		Locate and understand the use of the **manual deluge valve**. This deluge system is for tank cooling in the event of a fire and in selected instances may be used for vapor control.
		ENSURE that proper **PPE is worn** and/or stationed near and upwind of the loading station. PPE will include but not limited to the following: • **Hard hat and safety glasses/face shield** • **Tyvek suit, (overalls and jacket)** • **PVC gloves** • **SCBA located up wind (bottle must be charged and ready for use prior to commencing transfer)**

Table 2 Anhydrous Ammonia Delivery

Initials	STEP
	ESTABLISH communications with control room via site radios or by phone. Phone number to control room is (603)766-1880 ext. 123
	DIRECT the tank truck to the unloading station and position for off-loading. **ENSURE** that truck hand break and wheel-chocks are set prior to connecting any hoses.
	VERIFY driver is wearing proper PPE for the transfer.

	BARRICADE the delivery area.
	INSPECT delivery lines and fittings for kinks, cuts, abrasions, and general wear prior to connecting to the ammonia skid.
	ENSURE that you know how the emergency shut off works for the delivery truck and for the tanks. The tanks emergency shut off is in line with GT 1 train under the HRSG. Operate the air bleed valve to ensure acceptable operation.
	Open unloading cap and instruct driver to connect the hoses from the tanker to the fill line and vapor lines.
	VERIFY proper operation of the emergency shutoff valves on the ammonia skid
	OPEN the delivery valves and check connections for leakage. If there is leakage, secure lineup and correct problem.
	STATION one person at the fill station with the driver and the second person either up wind off the transfer station or by the trip station for the emergency cutoff valves.
	If necessary, secure ammonia vaporizer to allow flow from truck to tank. This is more noticeable in during cold ambient. Communicate status of heater to control room.
	INSTRUCT Driver to begin unloading. Monitor the actions of the driver and assist only in case of an emergency.
	INFORM control room once filling has begun.
	Locally **MONITOR** tank pressure during the unload. If pressure drops to 80 psi re-energize heater. If running on liquid fuel with high flow you may need to secure the filling operation to allow the tank pressure to recover. Keep the Lead Operator informed of local tank status.
	When tank is filled (80%) re-energize heater and ensure pressure begins to climb to normal tank pressure of 100 psi.
	After the product has been transferred, **VERIFY** that the delivery valves are shut and the unloading hose is purged to remove all liquids. Use the bleeder hose to vent the remaining NH3 into the barrel of water. Ensure that when venting is complete that the hose is not left in the barrel, it may suck water up into the tank if there is any valve leakage.
	SHUT delivery valves.
	INSTRUCT Driver to disconnect delivery hose; any drips or residual must be directed to containment or drip pans.
	REPEAT necessary steps as required to fill the second tank
	When the driver is finished storing the hose, PPE may be removed.
	NOTIFY the Control Room that the chemical delivery is complete.

	SIGN the shipping paperwork and release the truck.
	REMOVE and STORE barricade. Clean up any caution or danger tape that was used in barricading the area.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
	Receiving paperwork will be delivered to the Ops Manager. This includes the original procedure with initials for each step. Any problems should be noted on the procedure, i.e. “no wheel chocks on site- new ones are needed”

7.4B – Anhydrous Ammonia (NH_3) Tank to Tank Transfer

Table 1 Anhydrous Ammonia Transfer Prerequisites

Initials		STEP
		REVIEW the Anhydrous Ammonia **MSDS** **Record Transfer Date**: _____
Initials #1	Initials #2	There **MUST** be two persons involved with this operation to provide a second check and back-up support in case of emergency. Both individuals must initial in the space provided.
		VERIFY Proper **operation** of applicable safety **showers/eyewash stations.**
		RECORD initial level of each tank prior to commencing transfer. **Tank #1**_____ **Tank #2** _____
		Locate and understand the use of the **manual deluge valve**. This deluge system is for tank cooling in the event of a fire and in selected instances may be used for vapor control.

Table 2 Anhydrous Ammonia Transfer

Initials	STEP
	ESTABLISH communications with control room via site radios or by phone. Phone number to control room is (603)766-1880 ext. 123
	Secure ammonia vaporizer in tank you want to transfer into by pressing Red X on control panel and allow pressure to decrease such that receiving tank is 10 psig lower. Communicate status of heater to control room.
	When pressure is 10-15 psig lower in the tank you want to transfer into, position the excess flow valve on bottom of **BOTH** tanks in the latched **OPEN** state (push towards hydrogen trailers), check for leaks, then slowly open the manual isolation on the crossover pipe and verify flow of product via sound and level indication.
	INFORM control room once transfer has begun.
	Locally **MONITOR** tank pressure during the transfer. If pressure drops to 80 psi re-energize heater. If running on liquid fuel with high flow you may need to secure the transfer operation to allow the tank pressure to recover. Keep the Lead Operator informed of local tank status. Monitor levels and pressures in the respective tanks while being in communication with the CRO and stand-by to stop transfer when instructed by CRO.
	When tanks have reached the equalized or required levels, close the excess flow valve on the tank with the **higher** pressure first, close the manual isolation valve on the ammonia crossover pipe and finally the excess flow valve on the tank that was transferred into.

	Re-energize heater and ensure pressure begins to climb to normal tank pressure of 100 psig.
	After the product has been transferred, **VERIFY** that the excess valves are shut and manual isolation is closed.
	NOTIFY the Control Room that the chemical transfer is complete.
	All paperwork will be delivered to the Ops Manager. This includes the original procedure with initials for each step. Any problems should be noted on the procedure, i.e. "leak detected on threaded connection for pressure gauge"
	If any steps in this procedure need to be changed, please inform the Operations Manager, as soon as possible.

7.5 –Scale Inhibitor GE Betz BL5400 "DeposiTrol" Tote-to-Tote Transfer

Table 1 Scale Inhibitor GE Betz BL5400 Tote-to-Tote Prerequisites

(Using Double Diaphragm Air Powered Pump)

Initials	STEP
	REVIEW the Scale Inhibitor GE Betz Depositrol BL-5400 MSDS **Record Transfer Date**: _____
	VERIFY Proper operation of applicable safety showers/eyewash stations.
	VERIFY Spill kit is available

Table 2 Required PPE

Initials	STEP
	PVC Apron (Yellow), PVC gloves, face shield, Respirator not normally necessary.

Table 3 GE Betz Scale Inhibitor Tote-to-Tote Transfer

Initials		STEP
		ESTABLISH communications with the control room
Initial#1	Initial#2	Use the forklift to pick up a tote and bring it to the cooling tower chemical building. Once the tote is at the chemical building, get out and check the label of the tote on the forklift and make sure it is the same as the label on the tote you will be toping off. It should say Scale Inhibitor GE Betz BL5400 "DeposiTrol". After one person has confirmed the correct tote is in place on the forklift a second person needs to go to the cooling tower chemical building and verify that the tote on the forklift matches the tote that is in place ready to be topped off. Two sets of initials from different people are required in the left hand column. **The product transfer is not permitted to take place without two sets of initials.**
		BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
		Before filling Chemical Totes, **INSPECT** delivery lines for kinks, cuts, abrasions, and general wear.
		Inspect tank for room for delivery and record level_____
		Obtain and inspect air hose, checking for kinks, cuts, abrasions and that the ends are secure with gaskets that are in good condition. Attach Chicago fittings and use

	retaining clips.
	Raise and position the tote on the forklift so that it is higher than the intake of the pump (less than 1 foot). Set the brake on the forklift and exit.
	Connect transfer hoses. Verify that the hose you are using is labeled for Scale Inhibitor GE Betz Depositrol BL-5400. Tape the "ears" of the hoses (4 locations: 2 on the hose from the full tote to the pump; 2 on the hose from pump to receiving tote.
	Open a vent on the full delivery tote to allow product removal. Open the vent and unscrew the cover on the receiving tote to prevent a build up of pressure.
	Slowly crack the discharge valve from the tote that is raised on the forklift. You should see/feel the liquid fill the hose from the tote to the intake of the pump. Check for leaks. If there are no leaks progress to the next step.
	Next crack open the on/off air valve on the pump, slowly. Watch level in site glass to ensure that product is flowing from the pump to the tote. Check level gauge on the receiving tote is not overfilled.
	Pickup hose from pump to receiving tote when delivery tote is empty or transfer is complete and pump is still running – to empty this section of hose. Make an attempt to empty suction hose if supply tote is not empty by closing suction valve off tote to the pump and raise suction hose to pump.
	Secure from transfer by closing the on/off air valve on the pump after the pump has been allowed to run dry.
	After allowing the line to drain slowly break the cam lock connection on the tote that is on the forklift. Go slow to allow the line to break vacuum and fully drain into the tote that was topped off.
	After draining the hose disconnect it from the tote that was topped off. Stow the hose neatly.
	NOTIFY the Control Room that the chemical delivery is complete.
	REMOVE and STORE barricades. Clean up any caution/danger tape that was used.
	Take the empty (or partially empty) tote to the turbine hall for storage.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced.
	Deliver the Scale Inhibitor GE Betz BL5400 tote transfer procedure checklist to the Operations Manager.

7.6 –Phosphate GE Betz HP3100 "OptiSperse"Tote-to-Tote Transfers

Table 1 Phosphate GE Betz HP3100 Tote-to-Tote Prerequisites

(Using Double Diaphragm Air Powered Pump)

Initials	STEP
	REVIEW the Phosphate GE Betz HP3100 MSDS **Record Transfer Date**: _____ **Caution: this material contains ~5% caustic and is corrosive to skin and eyes**
	Verify that you have the proper totes, GE Betz HP3100 Phosphate.
	VERIFY Proper operation of applicable safety showers/eyewash stations.
	VERIFY Spill kit is available

Table 2 Required PPE

Initials	STEP
	Hard Hat, Acid or Yellow Tyvek Suit, PVC Gloves, face shield with safety glasses.

Table 3 Phosphate GE Betz HP3100 Delivery

Initials		STEP
		ESTABLISH communications with the control room
Initial#1	Initial#2	Use the forklift to pick up a tote and bring it to the phosphate injection chemical building. Once the tote is at the chemical building, get out and check the label of the tote on the forklift and make sure it is the same as the label on the tote you will be toping off. It should say GE Betz HP3100 "OptiSperse". After one person has confirmed the correct tote is in place on the forklift a second person needs to go to the Phosphate chemical building and verify that the tote on the forklift matches the tote that is in place ready to be topped off. Two sets of initials from different people are required in the left hand column. **The product transfer is not permitted to take place without two sets of initials.**
		BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
		Before filling Chemical Totes, **INSPECT** delivery lines for kinks, cuts, abrasions, and general wear.
		Inspect tank for room for delivery and record level_____

	Obtain and inspect air hose, checking for kinks, cuts, abrasions and that the ends are secure and gaskets are in good condition. Attach "Chicago fittings" and use retaining clips.
	Raise and position the tote on the forklift so that it is higher than the intake of the pump (less than 1 foot). Set the brake on the forklift and exit.
	Connect transfer hoses. Verify that the hose you are using is labeled for Phosphate GE Betz HP3100. Tape the "ears" of the hoses (4 locations – 2 on hose from full tote to pump; 2 on hose from pump to receiving tote. Stainless Steel fittings are to be used.
	Open a vent on the full delivery tote to allow product removal. Open the vent and unscrew the cover on the receiving tote to prevent a build up of pressure.
	Slowly crack the discharge valve from the tote that is raised on the forklift. You should see/feel the liquid fill the hose from the tote to the intake of the pump. Check for leaks. If there are no leaks progress to the next step.
	Next crack open the on/off valve on the pump, slowly. Watch level in site glass to ensure that product is flowing from the pump to the tote. Check level gauge on receiving tote to ensure that the tote is not overfilled.
	Pickup hose from pump to receiving tote when delivery tote is empty or transfer is complete and pump is still running – to empty this section of hose. Make an attempt to empty suction hose if supply tote is not empty by closing suction valve off tote to the pump and raise suction hose to pump.
	Secure from transfer by closing the discharge valve on the tote that is on the forklift.
	After allowing the line to drain slowly break the cam lock connection on the tote that is on the forklift. Go slow to allow line to break vacuum and fully drain into the tote that was topped off.
	After draining the hose disconnect it from the tote that was topped off. Stow the hose neatly.
	NOTIFY the Control Room that the chemical delivery is complete.
	REMOVE and STORE barricades. Clean up any caution/danger tape that was used.
	Take the empty (or partially empty) tote to the turbine hall for storage.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced.
	Deliver the Phosphate GE Betz HP3100 "OptiSperse" tote transfer procedure checklist to the Operations Manager.

7.7 –Oxygen Scavenger GE Betz OS5607 "CORTROL"

Table 1 Oxygen Scavenger GE Betz OS-5607 Tote-to-Tote Prerequisites

(Using Double Diaphragm Air Powered Pump)

Initials	STEP
	REVIEW the Oxygen Scavenger GE Betz "CORTROL" OS-5607 MSDS **Record Transfer Date**: _____
	Verify that you have the proper totes, Oxygen Scavenger GE Betz OS5607
	VERIFY Proper operation of applicable safety showers/eyewash stations.
	VERIFY Spill kit is available

Table 2 Required PPE

Initials	STEP
	Hard Hat, Acid or Yellow Tyvek Suit, PVC Gloves, face shield with safety glasses.

Table 3 Oxygen Scavenger GE Betz OS5607 "CORTROL" Tote-to-Tote transfer

Initials		STEP
		ESTABLISH communications with the control room
Initial#1	Initial#2	Use the forklift to pick up a tote and bring it to the cooling tower chemical building. Once the tote is at the chemical building, get out and check the label of the tote on the forklift and make sure it is the same as the label on the tote you will be toping off. It should say Oxygen Scavenger GE Betz OS5607 "CORTROL". After one person has confirmed the correct tote is in place on the forklift a second person needs to go to the turbine hall and verify that the tote on the forklift matches the tote that is in place ready to be topped off. Two sets of initials from different people are required in the left hand column. **The product transfer is not permitted to take place without two sets of initials.**
		BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
		Before filling Chemical Totes, **INSPECT** delivery lines for kinks, cuts, abrasions, and general wear.

	Inspect tank for room for delivery and record level_____
	Obtain and inspect air hose, checking for kinks, cuts, abrasions and that the ends are secure and gaskets are in good condition. Attach "Chicago fittings" and use retaining clips.
	Raise and position the tote on the forklift so that it is higher than the intake of the pump (less than 1 foot). Set the brake on the forklift and exit.
	Connect transfer hoses. Verify that the hose you are using is labeled for Cortrol GE Betz OS-5607. Tape the "ears" of the hoses (4 locations – 2 on hose from full tote to pump; 2 on hose from pump to receiving tote. Stainless Steel fittings are to be used.
	Open a vent on the full delivery tote to allow product removal. Open the vent and unscrew the cover on the receiving tote to prevent a build up of pressure.
	Slowly crack the discharge valve from the tote that is raised on the forklift. You should see/feel the liquid fill the hose from the tote to the intake of the pump. Check for leaks. If there are no leaks progress to the next step.
	Next crack open the on/off valve on the pump, slowly. Watch level in site glass to ensure that product is flowing from the pump to the tote. Check level gauge on receiving tote to ensure that the tote is not overfilled.
	Pickup hose from pump to receiving tote when delivery tote is empty or transfer is complete and pump is still running – to empty this section of hose. Make an attempt to empty suction hose if supply tote is not empty by closing suction valve off tote to the pump and raise suction hose to pump.
	Secure from transfer by closing the discharge valve on the tote that is on the forklift.
	After allowing the line to drain slowly break the cam lock connection on the tote that is on the forklift. Go slow to allow line to break vacuum and fully drain into the tote that was topped off.
	After draining the hose disconnect it from the tote that was topped off. Stow the hose neatly.
	NOTIFY the Control Room that the chemical delivery is complete.
	REMOVE and STORE barricades. Clean up any caution/danger tape that was used.
	Take the empty (or partially empty) tote to the turbine hall for storage.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced.
	Deliver the Oxygen Scavenger GE Betz OS5607 CORTROL tote transfer procedure checklist to the Operations Manager.

7.8 –Aqua Ammonia GE Betz NA1321 "SteamMate" Bulk Delivery

Table 1 Aqua Ammonia GE Betz NA1321 "SteamMate" Tote-to-Tote Prerequisites

(Using Double Diaphragm Air Powered Pump)

Initials	STEP
	REVIEW the Aqua Ammonia GE Betz NA1321 "SteamMate" MSDS **Record Transfer Date**: _____
	Verify that you have the proper totes, Aqua Ammonia GE Betz NA1321 "SteamMate"
	VERIFY Proper operation of applicable safety showers/eyewash stations.
	VERIFY Spill kit is available

Table 2 Required PPE

Initials	STEP
	Hard Hat, Acid or Yellow Tyvek Suit, PVC Gloves, face shield with safety glasses.

Table 3 Aqua Ammonia GE Betz NA1321 "SteamMate" Tote-to-Tote Transfer

Initials		STEP
		ESTABLISH communications with the control room
Initial#1	Initial#2	Use the forklift to pick up a tote and bring it to the Turbine Hall by the condensate pumps. Once the tote is at the condensate pumps, get out and check the label of the tote on the forklift and make sure it is the same as the label on the tote you will be toping off. It should say Aqua Ammonia GE Betz NA1321 "SteamMate"" After one person has confirmed the correct tote is in place on the forklift a second person needs to go to the turbine hall and verify that the tote on the forklift matches the tote that is in place ready to be topped off. Two sets of initials from different people are required in the left hand column. **The product transfer is not permitted to take place without two sets of initials.**
		BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
		Before filling Chemical Totes, **INSPECT** delivery lines for kinks, cuts, abrasions, and general wear.
		Inspect tank for room for delivery and record level_____.
		Obtain and inspect air hose, checking for kinks, cuts and abrasions, and that ends are secure and that gaskets are in good condition. Attach Chicago fittings and use retaining clips.

	Raise and position the tote on the forklift so that it is higher than the intake of the pump (less than 1 foot). Set the brake on the forklift and exit.
	Connect transfer hoses. Verify that the hose you are using is labeled for Aqua Ammonia GE Betz NA1321 "SteamMate". Tape the "Ears" of the hoses (4 locations – 2 on hose from delivery tote to pump, 2 on hose from pump to receiving tote. **No Aluminum fittings can be used**.
	Open a bung on the delivery tote to allow product removal. Open the vent and unscrew the cover on the receiving tote to prevent a build up of pressure.
	Slowly crack the discharge valve from the tote that is raised on the forklift. You should see/feel the liquid fill the hose from the tote to the intake of the pump. Check for leaks. If there are no leaks progress to the next step.
	Next crack open the on/off valve on the pump, slowly. Watch level in site glass to ensure that product is flowing from the pump to the tote. Check level gauge on receiving tote is not overfilled.
	Pickup hose from pump to receiving tote when delivery tote is empty and pump is still running – to empty this section of hose.
	Secure transfer by closing the on/off valve on the pump after the pump has been allowed to run dry.
	After allowing the line to drain slowly break the cam lock connection on the tote that is on the forklift. Go slow to allow line to break vacuum and fully drain into the tote that was topped off.
	After draining the hose disconnect it from the tote that was topped off. Stow the hose neatly.
	NOTIFY the Control Room that the chemical delivery is complete.
	REMOVE and STORE barricades. Clean up any caution/danger tape that was used.
	Take the empty (or partially empty) tote to the turbine hall for storage.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced.
	Deliver the Aqua Ammonia GE Betz NA1321 "SteamMate" tote transfer procedure checklist to the Operations Manager.

7.9 – Sodium Bisulfite GE Betz DT1404 "Spectrus"

Table 1 Sodium Bisulfite Transfer Prerequisites

Initials	Step
	REVIEW the Sodium Bisulfite GE Betz DT1404 "Spectrus"MSDS **Record Transfer Date**: _____
	VERIFY Proper operation of applicable safety showers/eyewash stations.
	VERIFY Spill kit is available and has applicable supplies: Speedi-dry or similar Squeegee Shovel Sorbent materials **WARNING:** **If spilled dilute with water, note that it will generate Sulfur Dioxide fumes when water is applied.**

Table 2 Required PPE

Initials	Step
	Apron, PVC/Nitrile Gloves, Full Face Respirator with Combo Cartridges and Hard Hat.

Table 3 Sodium Bisulfite Dispensing

Initials		Step
		ESTABLISH communications with the control room
Initial #1	Initial #2	Bring the drum you are transferring from to the area next to the mixing tank. **Verify the label says Sodium Bisulfite GE Betz DT1404 "Spectrus".** After you have done this have a second person double-check the label. Two sets of initials are required to continue with the transfer.
		Don your PPE and examine the tank for leaks or obvious problems. Turn the mix off. If possible open the doors and turn on fans for added ventilation.

	If the tank is empty, then add water to the mark on the right hand scale that says “E”(w). This stands for empty-water. If the tank is Partially full, and is sitting at the low cutoff switch, then water is added by the left hand scale, and should be filled to the mark that says “PF-W”. This stands for partially full-water.
	If using a new barrel you will need to drop the transfer pump into the new barrel. Ensure the gland is tight to prevent excess fumes from escaping.
	Place the pump discharge hose into the tank. Keep the cover closed as much as possible to prevent excess fumes from escaping.
	Ensure the pump is off, and then plug it in.
	Transfer product into the tank and fill to either the mark on the left “PF-S” if the tank level was at the low cutoff prior top adding water, or to the right hand scale marked “E-S”if the tank was empty when you added water. These stand for Partially Full-Sodium Bisulfate or Empty-Sodium Bilsulfite.
	When finished transferring you can leave the barrel in place with the hose neatly coiled on top. Turn on the mixer for a while to mix the tank.
	NOTIFY the Control Room that the chemical delivery is complete.
	PPE may be removed when the hose and pump are stowed.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
	The Sodium Bisulfite GE Betz DT1404 “Spectrus” transfer checklist will be delivered to the Operations Manager.

7.10 –GE Betz Optiguard MCP600 (Phosphate) and CORTROL IS100 (Sulfite for Oxygen Scavenging)

Table 1 GE Betz Optiguard MCP600 and CORTROL IS100 Transfer Prerequisites

Initials	Step
	REVIEW the Optiguard MCP600 MSDS if transferring Optiguard MCP600 **Record Transfer Date**: _____
	REVIEW the CORTROL IS100 MSDS if transferring CORTROL IS100
	VERIFY Proper level in the portable eyewash station.
	Be Aware that if you have a spill in the auxiliary boiler it will drain to the blowdown sump.

Table 2 Required PPE

Initials	Step
	Apron, PVC/Nitrile Gloves, Full Face Respirator with Combo Cartridges and Hard Hat are required for transferring the powered Oxygen Scavenger CORTROL IS100. The respirator is not required for transferring phosphate as Optiguard MCP600, however a face-shield is.

Table 3 GE Betz Optiguard MCP600 dispensing

Initials		Step
		ESTABLISH communications with the control room
Initial #1	Initial #2	Verify that you have a jug of Optiguard MCP600 in the area immediately adjacent to the mixing tank. When you have verified the label, initial in the column to the left. Then have a second person verify the label, and have them sign to the left also.

	Don your PPE and examine the tank for leaks or obvious problems. If possible open the doors and turn on fans for added ventilation.
	Add the required amount of Optiguard MCP600 by either pouring the jug directly into the auxiliary boiler chemical tank, or use the labeled measuring container.
	NOTIFY the Control Room that the chemical delivery is complete.
	PPE may be removed when the Chemical containers are closed and stowed.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
	The Optiguard MCP600 transfer checklist will be delivered to the Operations Manager.

Table 4 GE Betz CORTROL IS100 dispensing

Initials		Step
		ESTABLISH communications with the control room
Initial #1	Initial #2	Verify that you have a barrel of the powdered Sulfite Oxygen Scavenger CORTROL IS100 in the auxiliary boiler building. When you have verified the label, initial in the column to the left. Then have a second person verify the label, and have them sign to the left also.
		Don your PPE and examine the tank for leaks or obvious problems. If possible open the doors and turn on fans for added ventilation.
		Add the required amount of CORTROL IS100 by using the labeled measuring cup to add the powdered chemical from the barrel to the auxiliary boiler chemical tank.
		NOTIFY the Control Room that the chemical delivery is complete.
		PPE may be removed when the Chemical containers are closed and stowed.
		PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced."
		The CORTROL IS100 transfer checklist will be delivered to the Operations Manager.

7.11 –Anti Foam GE Betz AF3551 "FOAMTROL" Tote-to-Tote Transfer

Table 1 Anti Foam GE Betz AF3551 Tote-to-Tote Prerequisites

Initials	STEP
	REVIEW the Anti Foam AF3551 "FOAMTROL" MSDS **Record Transfer Date**: _____
	VERIFY Proper operation of applicable safety showers/eyewash stations.
	VERIFY Spill kit is available

Table 2 Required PPE

Initials	STEP
	PVC Apron (Yellow), PVC gloves, face shield, Respirator not normally necessary.

Table 3 GE Betz Anti Foam Tote-to-Tote Transfer

Initials		STEP
		ESTABLISH communications with the control room
Initial#1	Initial#2	Use the forklift to pick up a tote and bring it to the cooling tower chemical building. Once the tote is at the chemical building, get out and check the label of the tote on the forklift and make sure it is the same as the label on the tote you will be toping off. It should say GE Betz AF3551 "FOAMTROL". After one person has confirmed the correct tote is in place on the forklift a second person needs to go to the cooling tower chemical building and verify that the tote on the forklift matches the tote that is in place ready to be topped off. Two sets of initials from different people are required in the left hand column. **The product transfer is not permitted to take place without two sets of initials.**
		BARRICADE the delivery area. No work shall be performed near the unloading area during transfer.
		Before filling Chemical Totes, **INSPECT** delivery lines for kinks, cuts, abrasions, and general wear.
		Inspect tank for room for delivery and record level_____
		Ensure that the vent is open on the tote that is on the forklift.

	Raise and position the tote on the forklift so that it is higher than the tote to be filled. Set the brake on the forklift and exit.
	Connect transfer hoses. Verify that the hose you are using is labeled for FoamTrol.
	Slowly crack the discharge valve from the tote that is raised on the forklift. Check for leaks. If there are no leaks progress to the next step.
	Next crack open the fill valve on the tote that is to be filled. Watch level in site glass and ensure that the tote is not overfilled.
	Secure from transfer by closing the discharge valve on the tote that is on the forklift.
	After allowing the line to drain slowly break the cam lock connection on the tote that is on the forklift. Go slow to allow the line to break vacuum and fully drain into the tote that was topped off.
	After draining the hose disconnect it from the tote that was topped off. Stow the hose neatly.
	NOTIFY the Control Room that the chemical delivery is complete.
	REMOVE and STORE barricades. Clean up any caution/danger tape that was used.
	Take the empty (or partially empty) tote to the turbine hall for storage.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced.
	Deliver the Anti Foam GE Betz AF3551 tote transfer procedure checklist to the Operations Manager.

7.12 – GT False Start Drain Tank Transfer to Drum Procedure

Table 1 Low Sulfur Diesel Fuel Transfer to Drum Prerequisites

Initials	Step
	REVIEW the Low Sulfur Diesel Fuel (B-950) MSDS **Record Transfer Date**: _____
	VERIFY proper level in the portable eyewash station on the cart.

Table 2 Required PPE

Initials	Step
	Apron, PVC/Nitrile Gloves, Goggles, and Hard Hat are required for transferring the Low Sulfur Diesel Fuel Oil.
	Have on hand a stack of absorber pads (PIGS) to clean up any possible residual fuel oil.

Table 3 Low Sulfur Diesel Fuel Transferring

Initials	Step
	Ensure there are enough steel 55 gallon **sealed top** drums in the Conex box. **Approx. 25% level in tank = one 55 gallon drum.** Examine the drums for obvious problems.
	Using the drum dolly or forklift with drum-lift attachment, station drums at False Start Drain Tank area on the floor.
	Wheel over the designated False Start Drain Tank double diaphragm pump on the cart to the drain tank location. Ensure you have the suction/discharge hoses, a bung wrench, wrenches, grounding strap, and appropriate labels for the drums.
	Before transferring to drums, **INSPECT** delivery and suction lines for kinks, cuts, abrasions, and general wear.
	Using the grounding strap, attach one end to the drum and the other end to the nearby grounding cable on the floor. **Do not proceed to the next step until the drum has been properly grounded.**
	ESTABLISH communications with the control room

	Remove the sump cover.
	Ensure local air inlet ball valve is closed. Hook up nearby air hose to double-diaphragm pump air inlet fitting. Ensure a pin connection with retainer has been established. Crack open-air supply valve.
	After lining up the suction/discharge hoses, start the pump by cracking open the local air valve at the pump inlet. Verify pumping operation by monitoring the drum content level rise. If there are no leaks progress to the next step.
	Close the pumps inlet air ball valve when drum is full. Ensure all residual in lines are clear before removing. **If it is the last drum, lift up the suction line, start pump again to clear out residual in the suction/discharge lines and pump casing.**
	After residual has been cleared, close the air supply valve at the service air header connection.
	Start pump again to relief pressure in the air hose.
	Close the local air inlet ball valve at the pump.
	NOTIFY the Control Room that the fuel oil transfer is complete.
	Disconnect air hose from pump and store hose.
	Store equipment back on the cart.
	Replace sump cover and secure bolts. *Having the cover in place is to ensure that if a fire occurs in the tank, the vent line flame arrestor is used.*
	Tighten caps on the drums. **Do not proceed until all caps are secure and tight.**
	Using the forklift with drum-lift attachment, place all drums in the Hazmat building. **Label all drums accordingly and record drums in the Hazmat building Log.**
	PPE may be removed when the 55-gallon drums are closed and stowed.
	PPE will be inspected prior to rinsing to determine if it is still in safe/useable condition. If it is safe and useable it will be washed and hung to dry. If it is not safe/useable it will be disposed of properly and replaced.
	Deliver the False Start Drain Tank transfer procedure checklist to the Operations Manager.

8.0 – ALARMS AND EMERGENCY CONDITIONS

8.1 - Alarms

At the DCS, several Chemical System indications and alarms can be monitored. In general at an alarm, the operator has to **REVIEW** the system parameters concerned and **CHECK** possible other system alarms to establish the cause for the alarm. Table 3 lists the alarms and actions to be taken concerning the various Chemical Systems. For the actual settings of the alarm and trip points refer to the following documents;

- Field Instruments and Material List
- The Unit Control Sequence Program
- The Unit Control Specifications

Table 28 Chemical Unloading Alarms and Actions to Be Taken

ALARM DESCRIPTION	ACTIONS	SETPOINT
1CI-LAH-0500 Sodium Hypochlorite Tank High Level **Alarm**	• **Secure** Chemical Unloading	90%
1DW-LAH-0152 Bulk Acid Storage Tank High Level **Alarm**	• **Secure** Chemical Unloading	90%
1DW-LAH-0153 Bulk Caustic Storage Tank High Level **Alarm**	• **Secure** Chemical Unloading	90%
1CI-LAH-1570 & 2570 Anhydrous Ammonia Storage Tank High Level **Alarms**	• **Secure** Chemical Unloading	82%

Filename:	NEL Operating Procedures Haz Chem SystemRev11.doc
Directory:	P:\OPERATIONS MNGR FILES\Ops Documents - Latest Revs
Template:	C:\Documents and Settings\harrisch\Application Data\Microsoft\Templates\Normal.dot
Title:	NEL Operating Procedures
Subject:	Haz. Chem. Delivery
Author:	Procedure Team
Keywords:	
Comments:	
Creation Date:	9/26/2007 10:53 AM
Change Number:	70
Last Saved On:	10/31/2007 10:54 AM
Last Saved By:	GE Energy
Total Editing Time:	508 Minutes
Last Printed On:	10/31/2007 10:54 AM
As of Last Complete Printing	
Number of Pages:	39
Number of Words:	12,087 (approx.)
Number of Characters:	68,901 (approx.)

ERP-09 – ANHYDROUS AMMONIA RELEASE PROCEDURE

The objective of this Anhydrous Ammonia Release Emergency Response Procedure is to identify the appropriate actions to take when a release of anhydrous ammonia occurs from the storage tank, lines, or vaporization equipment located on the North side of HRSG # 1. The intent is to minimize the health, safety and environmental impacts from a release of anhydrous ammonia at the facility and surrounding community and to restore the facility to normal operating conditions as quickly as possible.

1. Ammonia has a strong, pungent odor that makes even the smallest of leaks easily detectable by smell. A medium to large leak of ammonia could be detectable from a safe distance through a visual white cloud escaping from the source leak

2 A release is controllable if the ammonia flow can be shut-off or contained without employees being exposed to health or safety risks, or where the rate of release does not pose immediate danger (e.g , a faint ammonia odor is evident). In this situation, notification should be made immediately to CONTROL ROOM to alert First Responders who are properly trained to shut down required processes, if necessary, and/or the ammonia gas flow

3 A release is uncontrollable if attempts to shut-off or control the ammonia flow would place a person at a health or injury risk In this situation, persons should not attempt to contain the release. Instead, they should evacuate the immediate area of the release by moving laterally or upwind of the release area and initiate notifications as indicated below. In the event of an uncontrollable release, the public will be notified and evacuated by the police and fire department. If there is a large vapor release the water deluge system should be triggered remotely to quench the offending vapors

3a After personnel move to a location lateral or upwind from the release area, they should call the CONTROL ROOM and inform the CONTROL ROOM of the location (inside or outside) of the release and wind direction or direction in which the vapors appear to be moving (if known)

4. The CONTROL ROOM shall dispatch the First Responders to the scene. The Responder(s) will approach the area from an upwind or lateral direction to secure the area and determine whether evacuation of the Plant is necessary and/or outside resources are needed to control the release.

4a. If evacuation is required, First Responders shall follow ERP-03 and direct employees along evacuation routes and to a rally point that would not be exposed to the ammonia vapors.

4b. Upon evaluation of the release at a safe distance, the Incident Commander will request the CONTROL ROOM to notify Newington Fire (external 911) and/or the on-site hazardous waste contractor to control the release. The CONTROL ROOM will provide the outside responders with directions to approach the incident safely. If these outside resources are called in, the Incident Commander shall also request the CONTROL ROOM notify the EHS Responder and Emergency Coordinator

5 If it is safe to do so, First Responders shall coordinate with plant personnel to shut off any ventilation systems and close windows and doors in the area to prevent the spread of the ammonia vapors to other areas of the building

6 Emergency Coordinator report to the scene, if necessary, and coordinate with Newington Fire and/or hazardous waste contractor to determine if additional evacuation of the facility and any off-site, down wind locations is necessary The Incident Commander will open the Emergency Operations Center, if necessary, and coordinate the response efforts from there or an alternative location

7. The EHS Responder will evaluate the need for regulatory reporting (if the release exceeds the reportable quantity of 100 pounds or there is an off-site threat) and contact the Emergency Coordinator if regulatory notification is required.

8 Responders shall continually evaluate the need for medical services, rescue operations, and additional evacuation Indication of potential serious health effects from ammonia vapors may include convulsive coughing, difficult and painful breathing, and/or eye irritation Direct skin contact with liquid anhydrous ammonia can produce chemical and freeze burns requiring prompt medical attention

9. After the ammonia release has been controlled and ammonia vapors have dissipated, the Incident Commander shall meet with the Responders to determine that no threat to health or safety exists and then give the all clear signal.

10. After the incident is terminated, the Incident Commander will document response actions and conduct a debriefing/critique of the Anhydrous Ammonia Release ERP

PERSONNEL SPECIFIC DUTIES

Control Room

- Incident Commander until relieved
- Serve as communications coordinator, log all communications.
- Notify the First Responders
- Notify additional resources as directed by the Incident Commander

First Responders

- Respond to all real and potential emergencies as directed by the CONTROL ROOM and/or Incident Commander
- Provide security
- Provide traffic and crowd control. Direct response vehicles
- Coordinate/assist with other Responders.
- Assist with evacuation.
- Provide medical assistance.
- Assist with closing windows and doors and shutting down the building ventilation system if it is safe to do so
- Assist in keeping people away from the affected area until the all clear signal is given by the Incident Commander.
- Perform hazard evaluation
- Report to the location of the emergency as reported by the CONTROL ROOM and/or Incident Commander.
- Perform hazard evaluation
- Coordinate with/assist other responders.
- Direct response vehicles.
- Assist with evacuation.
- Assist with closing windows and doors and shutting down the building ventilation system if it is safe to do so.
- Assist in keeping people away from the affected area until the all clear signal is given by the Incident Commander.
- Coordinate with/assist other Responders.
- Serve as Incident Commander, if necessary
- Request CONTROL ROOM to notify EHS Responders, on-site hazardous waste contractor, Newington Fire, and Emergency Coordinator, if necessary.
- Assist with closing windows and doors and shutting down the building ventilation system if it is safe to do so
- Provide assistance with utility shut off and control.
- Assign personnel to proceed to gate to direct Responders to scene.
- Assist in keeping people away from the affected area until the all clear signal is given by the Incident Commander

Maintenance Personnel

- Perform any necessary immediate process or ammonia flow shut downs, check for leaks, make minor repairs (e g , tighten valves, fittings, etc.) if qualified and it is safe to do so.
- Provide assistance with utility shut off and control
- Assist with closing windows and doors and shutting down the building ventilation system if it is safe to do so.
- Assist in keeping people away from the affected area until the all clear signal is given by the GE Incident Commander.

Environmental Health and Safety

- EHS Responder and other EHS personnel patrol the area at a safe distance to identify additional safety and environmental hazards.
- Serve as Incident Commander, if necessary.
- Evaluate the need for regulatory reporting and make regulatory notifications as directed by Emergency Coordinator.
- Assist with evacuation
- Assist in keeping people away from the affected area until the all clear signal is given by the GE Incident Commander.

Emergency Coordinator

- Coordinate with other Responder(s)
- Serve as Incident Commander, if necessary.
- Direct regulatory notifications
- Coordinate with regulatory agencies if evacuation is necessary.

Incident Commander

- Coordinate Responders.
- Request CONTROL ROOM to make notifications for additional resources.
- Notify Emergency Coordinator of any property damage, injuries, or hospitalization.
- Coordinate with Newington Fire.
- Provide the all clear signal once the incident is resolved
- Document response actions and conduct debriefing/critique of ERP.

OFF-site Hazardous Waste Contractor

- Contain or control the ammonia release using appropriate measures (water deluge spray and/or cover with tarp) wearing appropriate PPE (level B or A)
- Take defensive measures to prevent any water used for defensive measures from reaching storm drains
- Assist with closing windows and doors and shutting down the building ventilation system if requested by the Incident Commander if Level B or A PPE is required to perform the tasks

Newington Fire Department

- Provide a water deluge spray, if required, to control an ammonia vapor release.
- Provide medical assistance
- Conduct search and rescue operations

ERP-09 ***Anhydrous Ammonia Release Emergency Procedure***
1. If a release is <u>controllable</u> (i.e., flow can be shut off or contained without employee exposure or safety risk), notify appropriate plant personnel who are trained to shut down the system. Call the Control Room and request the CONTROL ROOM to dispatch First Responders if evacuation of the immediate area and/or other preventative measures may be required
2. If a release is <u>uncontrollable</u> (i.e., attempts to shut off or contain the flow would place a person at a health or safety risk), evacuate the immediate area by moving upwind or laterally from the area. Inform the CONTROL ROOM of the location of the release and direction which the ammonia vapors appear to be moving.
3 If incident presents an immediate danger (i.e , threat of explosion, fire, vapor hazard), CONTROL ROOM dispatches first responders and calls external 911 (Newington 911) and/or the off-site hazardous waste contractor to control the release. Responders will approach the area from an upwind or lateral direction
4. CONTROL ROOM notifies EHS Responder and Emergency Coordinator if off-site resources notified and /or other potential safety or environmental hazards exist
5. Responder(s) determine if hazards affect evacuation routes, identify rally points and evaluate evacuation of downwind plant areas and off-site areas Refer to the City of Newington Community Evacuation Plan for off-site evacuation procedures.
5. Employees evacuate the building with assistance from First Responders and report to the designated rally points. Proceed to alternate or secondary rally point if pathway is obstructed.
6. Incident Commander evaluates need for personnel searches and/or rescues, and notifies Responder(s) if necessary. Newington Fire conducts searches and/or rescues, if necessary
7. Responders coordinate with maintenance personnel to shut off any ventilation systems and close windows and doors in the area (if safe to do so)
8. Responders evaluate incident for other potential safety or environmental hazards. EHS Responder will determine if regulatory reporting criteria are met Emergency Coordinate will make or direct any regulatory notifications
9 Responder(s) determine if incident is resolved and emergency secured. GE Incident Commander makes "all-clear" announcement, who in turn notify Rally Point leaders.
10 Incident Commander conducts a debriefing/critique of the Anhydrous Ammonia Release ERP.

GECS/NEL - Machine/Equipment Specific Lockout/Tagout Procedure

Machine Type	**Ammonia Dilution Air Blower**	LoTo #	

Energy Type	**Stored**	**Dynamic**
ELECTRICAL	None	Controls, Blower Itself
STORED MECHANICAL	Pressure	None
PNEUMATIC	None	None
HYDRAULIC	None	None
OTHER		

1 SHUTDOWN

- Close and LOTO vapor line to heater
- Open electrical disconnect for control panel
- Open electrical disconnect for blower
- Consider LOTO of vapor deluge system

2. ISOLATION LOCKOUT/TAGOUT

Apply appropriate LOCKOUT/TAGOUT rules for above.

3 RELEASE OF STORED ENERGY

- Double block and bleed above noted valves .

4 VERIFY ISOLATION

Verify isolation with a voltmeter.
Attempt to initiate all associated controls
Check all associated gauges for zero

5. RETURN TO SERVICE

After maintenance is complete, remove all tools and debris, be sure all safety guards are in place, check the area around the unit to ensure that all employees are in the clear, restore the energy sources to the machine/equipment.

GECS/NEL - Machine/Equipment Specific Lockout/Tagout Procedure

Machine Type	**Ammonia Dilution Air Heater**	LoTo #	

Energy Type	**Stored**	**Dynamic**
ELECTRICAL	None	Controls, Blower Itself
STORED MECHANICAL	Pressure	None
PNEUMATIC	None	None
HYDRAULIC	None	None
OTHER		

1 SHUTDOWN

- Close and LOTO Vapor outlet from blower to heater
- Close and LOTO vapor line from heater to mixer (units are in parallel, there are 2 valves for each)
- Close and LOTO mixer valves leading to manifold with heater
- Open electrical disconnect for control panel
- Open electrical disconnect for blower
- Consider LOTO of vapor deluge system

2. ISOLATION LOCKOUT/TAGOUT

Apply appropriate LOCKOUT/TAGOUT rules for above

3 RELEASE OF STORED ENERGY

- Double block and bleed above noted valves

4. VERIFY ISOLATION

Verify isolation with a voltmeter.
Attempt to initiate all associated controls
Check all associated gauges for zero

5. RETURN TO SERVICE

After maintenance is complete, remove all tools and debris, be sure all safety guards are in place, check the area around the unit to ensure that all employees are in the clear, restore the energy sources to the machine/equipment

GECS/NEL - Machine/Equipment Specific Lockout/Tagout Procedure

Machine Type	**Ammonia Tank**	LoTo #	

Energy Type	**Stored**	**Dynamic**
ELECTRICAL	None	Controls, Vaporizer
STORED MECHANICAL	Pressure	None
PNEUMATIC	None	None
HYDRAULIC	None	None
OTHER		

1. SHUTDOWN
   - After draining tank contents to an approved tanker;
   - Close and LOTO incoming liquid and vapor loading lines
   - Close and LOTO Tank outlet to vaporizer
   - Close and LOTO Vapor outlet to blower skid
   - Close and LOTO Vapor return to tank from vaporizer
   - If necessary Open electrical disconnect for control panel
   - If necessary open electrical disconnect for vaporizer
   - Consider LOTO of vapor deluge system

2. ISOLATION LOCKOUT/TAGOUT

   Apply appropriate LOCKOUT/TAGOUT rules for above

3 RELEASE OF STORED ENERGY

   - Double block and bleed above noted valves.

4. VERIFY ISOLATION

   Verify isolation with a voltmeter.
   Attempt to initiate all associated controls
   Check all associated gauges for zero

5. RETURN TO SERVICE

After maintenance is complete, remove all tools and debris, be sure all safety guards are in place, check the area around the unit to ensure that all employees are in the clear, restore the energy sources to the machine/equipment

GECS/NEL - Machine/Equipment Specific Lockout/Tagout Procedure

Machine Type	**Ammonia Vaporizer**	LoTo #	

Energy Type	**Stored**	**Dynamic**
ELECTRICAL	None	Controls, Vaporizer itself
STORED MECHANICAL	Pressure	None
PNEUMATIC	None	None
HYDRAULIC	None	None
OTHER		

1 SHUTDOWN

- After draining tank contents to an approved tanker;
- Close and LOTO Tank outlet to vaporizer
- Close and LOTO Vapor outlet to blower skid
- Close and LOTO Vapor return to tank from vaporizer
- Open electrical disconnect for control panel
- Open electrical disconnect for vaporizer
- Consider LOTO of vapor deluge system

2 ISOLATION LOCKOUT/TAGOUT

Apply appropriate LOCKOUT/TAGOUT rules for above.

3 RELEASE OF STORED ENERGY

- Double block and bleed above noted valves.

4. VERIFY ISOLATION

Verify isolation with a voltmeter.
Attempt to initiate all associated controls
Check all associated gauges for zero

5. RETURN TO SERVICE

After maintenance is complete, remove all tools and debris, be sure all safety guards are in place, check the area around the unit to ensure that all employees are in the clear, restore the energy sources to the machine/equipment.

Appendix F

Recordkeeping

Annual Certification of Operating Procedures
Inspection Checklist

TABLE F-1
Newington Energy
Newington, NH Facility

Compliance Audit Checklist

Background Information

Date of Audit Report: _____

Person Making Audit Report: _____

Phone Number:

Implementation of Risk Management Programs

	Date Items Inspected	Corrective Actions Taken? To Be Taken? (Date)
Safety Information		
MSDS Available?		
Valves in Working Order?		
P & ID Available?		
Hazard Review		
Storage Changes?		
Equipment Modifications?		
General Hazards?		
Operating Procedures		
Procedures Followed?		
PPE Used by All Staff?		
Good Housekeeping?		
Training		
Training Files Up to Date?		
New Employees?		
Hazard Communication?		
Maintenance		
Last Inspection?		
All Equipment Working?		
Shut Off Valves Working?		
Accident Investigation		
Procedures Followed?		
Follow Up Actions?		

Date of Last Audit: _____ *Next Audit Due:* _____

Last Two Audit Reports Kept Where: _____

Copies of Audit Provided To:

Table F-2

Annual Certification of Operating Procedures

Year	Procedures Reviewed	Name	Signature

Appendix G

Ammonia Training Outline

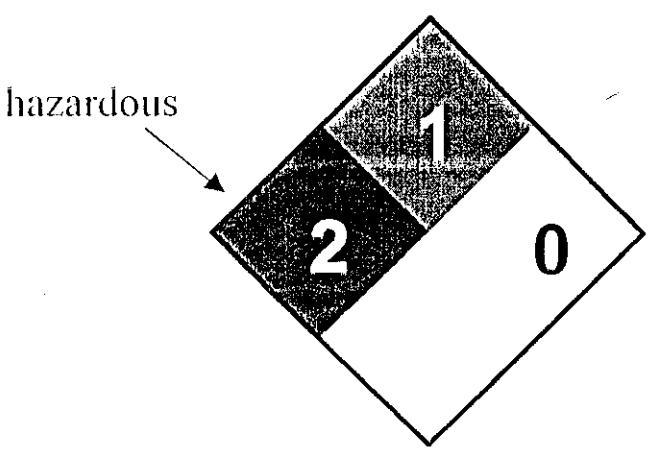
Anhydrous Ammonia

Background

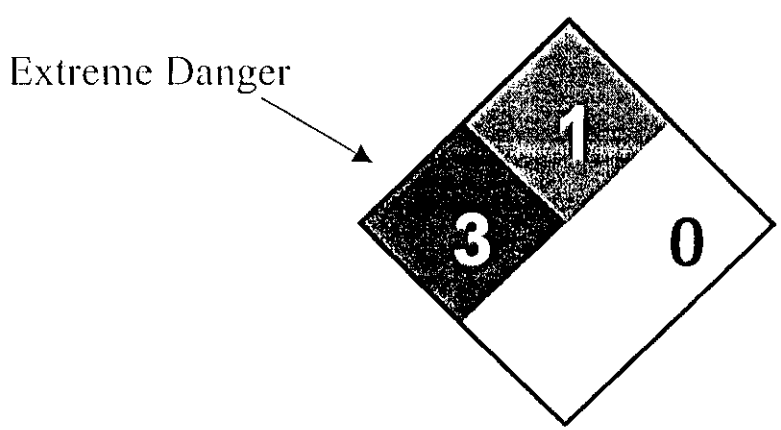
- Anhydrous ammonia (NH3) can be thought of as ammonia without the presence of water.
- Anhydrous ammonia can be a liquid or gas depending on temperature and pressure conditions.
  - Anhydrous ammonia is stored in a pressurized tank, and due to its volatile nature, there is a gas phase in the upper portion of the tank and liquid in the bottom.

Ingredients and Hazards

- The major hazards associated with anhydrous ammonia are the corrosive vapors and the threat of liquid (anhydrous ammonia) burning the skin.
- The pH of this material can easily be above 11, making it a powerful caustic.
- Ammonia gas can be suffocating and extremely irritating to the eyes, throat, and respiratory tract. Symptoms include shortness of breath, coughing, chest pains and pulmonary edema (fluid in the lungs).
- Contact with liquid anhydrous ammonia causes severe burns of the eyes and skin. The liquid "freezes" the skin on contact, although the skin is still being subjected to severe burns.



GAS



LIQUID

Physical Data

The physical properties of anhydrous ammonia are as follows:

Boiling point, 1 ATM.....	-33.4°C (-28°F)	Specific gravity, 60/60°C.....	0.62
Vapor pressure @ 60°C, mmHg.....	4800	Volatiles, %.....	ca 100
Vapor density (Air = 1).....	0.6	pH of 1% water soln.....	11.7
Solubility in water, g/100 cc:		Melting point, °C (°F).....	77.7 (-108)
@ 0°C.....	89.9	Molecular weight.....	17.04
@ 100°C.....	7.4		
Appearance and Odor: Colorless liquid or gas (depending on temperature and pressure) with strong pungent odor. Odor is detectable at 5 ppm; irritating at 25.50 ppm. Odor provides a warning of hazard.			

- Due to its low boiling point of -28°F, it will "boil" and evaporate at ambient temperatures.
- This physical characteristic gives ammonia its strong pungent odor.

Fire and Explosion

- AA is a gas at room temperature and is a moderate fire and explosion hazard when exposed to heat and/or flame.
- It will ignite if preheated, but it is considered a minimal flammability hazard (1 on the NFPA classification)
- The extinguishing agent of choice is a water spray or fog.

Reactivity Data

- AA is stable at room temperature if it if in a container.
- AA is an alkaline gas and reacts with acids with heat evolution.
- Avoid contact with mercury, chlorine, iodine, bromine, silver oxide, and hypochlorites, as explosive compounds could be formed.
- Contact with chlorine bleach can cause the evolution of hazardous chloramine gas.
- Do not use copper, brass, bronze or galvanized steel in contact with ammonia.
- Under normal circumstances, the reactivity of AA is not a major problem to the employees.

Health Hazard Information

- Ammonia gas can be suffocating and cause irritation to the eyes, throat, respiratory tract and effects can range from mild irritation to severe corrosion of body tissue.
- In the case of eye contact, flush eyes with copious amounts of water for at least 15 minutes.
- Skin contact should be treated in a similar manner, and contaminated clothing should be removed after it has been thawed.
- In case of inhalation, promptly move victim to fresh air and restore and/or support breathing, if required.
- **GET MEDICAL ATTENTION IMMEDIATELY**

Spill, Leak and Disposal Procedures

- Major Leaks: evacuate leak area and downwind area
- Eliminate ignition sources and provide ventilation if in a confined space.
- Use a cold water spray to absorb AA and stay upwind of vapors.
- DO NOT try to neutralize liquid AA with acid, as a violent reaction may occur.
- Limited amounts of ammonia solutions can be highly diluted with water for discharge, however, the discharge must not exceed established limits for ammonia.
- Collected spill materials may be hazardous per EPA regulations, if the pH is greater than 12.5.

Personnel Protection Information

- Each employee involved in the handling of ammonia while performing specific job functions, will be required to wear gloves, goggles and a protective over garment.

Special Precautions and Comments

- Contact lenses should not be worn under eye protective equipment when dealing with ammonia.

- Further information on the safe handling and storage of AA can be found in the guidelines set forth in ANSI K61.1, 1989 and OSHA 29 CFR 1910.111

QUIZ

Appendix H

Personal Protective Equipment (PPE)

Group	Type
Coveralls	Poly Coated Tyveks
	PVC Acid Suit
Respiratory	60 Min PP SCBA (Total of six (four w/ two backup))
	Full Face w/ Combo Cartridges
	10 Min Scat-Paks - For Escape
Gloves	PVC
	Neoprene
	Nitrile
	Nitrile - Surgical
	Kevlar
	Leather
	Welding
	High Temp
Eye	Safety Glasses
	Chemical Goggles
	Face Shield
Foot	Yellow Disposable Latex HazMat Boots (aka Nuke Boots)
	PVC Over Boots
	Steel toed safety shoes
Ear	Ear Plugs
	Ear Muffs
Electrical	Switch pullers Coat, Coverall and Hood
	00 gloves w/leathers
	Fire Resistant coveralls
Water	Life Jackets
Fall Protection	Full Body Harness
	Retractable Lanyards
	Decelaration Lanyards

Appendix I

Emergency Response Equipment

Spill Supplies onsite at NEL for NEL
1st responders

Location	Type	Quantity	Capacity	Hazarads
Demin Bldg	Chemical sorbents (Y)	1 bail of 50	25 gal	Sulfuric Acid Sodium Hydroxide, Sodium Bisilfite
	Pads on roll (Y)= Yellow	100	50 gal	Sulfuric Acid Sodium Hydroxide, Sodium Bisilfite
	Speedi-dri	2 bags		Sulfuric Acid Sodium Hydroxide, Sodium Bisilfite
	Squeege			Sulfuric Acid, Sodium Hydroxide Sodium Bisilfite
	Plastic shovel			Sulfuric Acid Sodium Hydroxide Sodium Bisilfite
	Lime (for acid Neut)	1 40 pound bag	n/a	Sulfuric Acid Sodium Hydroxide, Sodium Bisilfite
	Vinegar (acetic acid) for Caustic spill	1 gal	n/a	Sulfuric Acid Sodium Hydroxide Sodium Bisilfite
Truck Unloading rack at Fuel Oil	Oil sorbent pads (W or G) White or Gray)	1 bail of 50	25 gal	#2 Oil
	Sorbent boom	1 pkg of 4	12 gal	#2 Oil
	Speedi-dri	2 bags	n/a	#2 Oil
	Squeege			#2 Oil
Circ Water Chemical Bldg	Chemical sorbents (Y)	1 bail of 50	25 gal	Bleach Actibrom
	Pads on roll (Y)= Yellow	100	50 gal	Bleach, Actibrom
	Speedi-dri	2 bags		Bleach Actibrom
	Squeege			Bleach, Actibrom
	Plastic shovel			Bleach, Actibrom
Inside door between GT 2 and ST (back side) For Oil	Oil sorbent pads (W or G) White or Gray)	1 bail of 50	25 gal	Fuel Oil, Lube Oil
	Sorbent boom	1 pkg of 4	12 gal	Fuel Oil Lube Oil
	Speedi-dri	2 bags	n/a	Fuel Oil, Lube Oil
	Squeege			Fuel Oil Lube Oil
Inside door between GT 2 and ST (back side) For Chemicals	Chemical sorbents (Y)	1 bail of 50	25 gal	BT3000 Amine Solution Elimin-Ox (O2 scavenger)
	Pads on roll (Y)= Yellow	100	50 gal	BT3000 Amine Solution Elimin-Ox (O2 scavenger)
	Speedi-dri	2 bags		BT3000 Amine Solution Elimin-Ox (O2 scavenger)
	Squeege			BT3000 Amine Solution Elimin-Ox (O2 scavenger)
	Plastic shovel			BT3000 Amine Solution Elimin-Ox (O2 scavenger)
Lube Oil Skid Area	Oil sorbent pads (W or G) White or Gray)	1 bail of 50	25 gal	Lube Oil
	Sorbent boom	1 pkg of 4	12 gal	Lube Oil
	Speedi-dri	2 bags	n/a	Lube Oil
	Squeege			Lube Oil
Between GT 1 and 2 Generator End	Oil sorbent pads (W or G) White or Gray)	1 bail of 50	25 gal	Lube Oil and Fuel Oil
	Sorbent boom	1 pkg of 4	12 gal	Lube Oil and Fuel Oil
	Speedi-dri	2 bags	n/a	Lube Oil and Fuel Oil
	Squeege			Lube Oil and Fuel Oil
Inside door between GT 1 and GT 2 (back side) For Chemicals	Chemical sorbents (Y)	1 bail of 50	25 gal	BT3000 Amine Solution in courtyard
	Pads on roll (Y)= Yellow	100	50 gal	BT3000 Amine Solution in courtyard
	Speedi-dri	2 bags		BT3000 Amine Solution in courtyard
	Squeege			BT3000 Amine Solution in courtyard
	Plastic shovel			BT3000 Amine Solution in courtyard
Inside door between GT 1 and GT 2 (back side) For Oil	Oil sorbent pads (W or G) White or Gray)	1 bail of 50	25 gal	Lube Oil and Fuel Oil
	Sorbent boom	1 pkg of 4	12 gal	Lube Oil and Fuel Oil
	Speedi-dri	2 bags	n/a	Lube Oil and Fuel Oil
	Squeege			Lube Oil and Fuel Oil
River	Oil sorbent pads (W or G) White or Gray)	1 bail of 50	25 gal	Lube Oil and Fuel Oil
	Sorbent boom	1 pkg of 4	12 gal	Lube Oil and Fuel Oil
	Speedi-dri	2 bags	n/a	Lube Oil and Fuel Oil
	Squeege			Lube Oil and Fuel Oil
	Roll of rope			Lube Oil and Fuel Oil
	Knife			Lube Oil and Fuel Oil
	Cinder blocks for anchors			Lube Oil and Fuel Oil
Warehouse	Additional equipment surplus and spares			

Off-Site Piscataqua River Cooperative Equipment

ITEM	AMOUNT	TYPE	STORAGE LOCATION	OWNER
Tow Boat	1	31 Ft. EASTERN	Sprague Energy River Road	PRC
Tow Boat	1	27 Ft. LAFCO	Sprague Energy River Road	PRC
Tow Boat	1	25 foot MONARK	Sprague Energy River Road	PRC
Barge	1	25 Ft. WINNINGHOF	Sprague Energy River Road	PRC
Skimmer	1	25` JBF 420 catamaran	Sprague Yard Portsmouth	PRC
Boom Trailer	1		Sprague Yard Portsmouth	PRC
Boom Trailer	1		Sprague Yard Portsmouth	PRC
Boom Trailer	1		Sprague Yard Portsmouth	PRC
Boom Trailer	1		Sprague Yard Portsmouth	PRC
Skimmer	1	JBF 3001	Sprague Energy River Road	PRC
Barge	1	25 Ft. WINNINGHOF	Sprague Energy River Road	PRC
Barge	1	25 Ft. WINNINGHOF	Sprague Energy River Road	PRC
Skimmer	1	JBF 3001	Portsmouth Naval Ship Yard	PNSY
Tow Boat	1	Boston Whaler 25 foot	Moran Towing Dock	PHT
Boom Reel	1	Slickbar	PSNH Newington Station	PSNH
Boom Trailer	1	West cargo	PSNH Schiller Station	PSNH
Boom Reel	1		Sprague Energy River Road	Sprague
Boom Reel	1		Sprague Energy River Road	Sprague
Boom Trailer	1	Wells Cargo Trailer 1995	Irving Terminal Portsmouth	Irving
Building	1	Wood 8 x 12	Sprague Energy River Road	Sprague
Boom Reel	1	Slickbar	PSNH Schiller Station	PSNH
Skimmer	1	Kvichak-Marco	Portsmouth Naval Ship Yard	PNSY
Barge	1	Navy, 108 X 27 foot	Portsmouth Naval Ship Yard	PNSY
Tow Boat	1	Boston Whaler	Portsmouth Naval Ship Yard	PNSY
Tow Boat	1	Boston Whaler	Portsmouth Naval Ship Yard	PNSY
Utility Boat	1		Portsmouth Naval Ship Yard	PNSY
Barge	1		Sprague Energy River Road	PNSY
Boom Trailer	1		Portsmouth Naval Ship Yard	PNSY
Pump/Vacuum	1	Slickbar Trans-Vac 300DH	Sprague Energy Avery Lane	PRC
Computer	1	DELL	PSNH Newington Station	PRC
Computer	1	DELL	PSNH Newington Station	PRC
Skimmer	1	Prototype	UNH Ocean Engineering Dept.	UNH
Tow Boat	1	Sea Arc	Portsmouth Naval Ship Yard	PNSY
Aft Work Area Flood Light	3			
Anchor 20 lb. Danforth	2			
Anchor 40 lb. Danforth	1			
Anchor 55 lb. Fortress	10			
Anchor 65 lb. Danforth	2			
ANCHORS DRILLED	4			
ANCHORS W/CHAIN	2			
Antenna (light duty)	1			
Antenna extension (light duty)	2			

ASSORTED SORBENTS	1			
ASST. CARIBINERS	1			
ASST. LINES	1			
ASST. SHACKLES	6			
Beach Boom Water & Air Pumps	1			
Binoculars	1			
Binoculars (Paul Nevin's)	1			
Boat Hook	2			
Boom 12"	5450			
Boom 18"	15300			
Boom 18" Navy Connectors	900			
Boom 24"	2000			
Boom 24" Inflatable Beach Boom	550			
Boom 24" Navy Connectors	2600			
Boom 36"	2			
Boom 36" Navy Connectors	60			
Boom Tow Bridles	13			
BOOTS,GLOVES TYVEK SUITS	12			
Chain & Shackles	1			
Charts and Navigation Tools	1			
Cyalume Glow Stick Light	12			
Decon Pools	2			
Decon Shower Kit	1			
Depth Sounder	5			
Drum Leak Kit	1			
Electric extension cord	4			
Electric Generator	1			
Emergency Blanket	2			
Engine Manuals	1			
First Aid Kit	8			
Float Coat (PRC)	10			
Fuel Can (skimmer)	3			
FUEL CANS	12			
Gloves STEARNS Insulated	2			
GLOVES, STEARNS insulated	2			
Gloves, STEARNS Insulated	2			
GLOVES,BOOTS,TYVEK	2			

GPS	3			
Ground Tackle 5/8" Nylon	1206			
Ground Tackle 5/8" Nylon (Old)	450			
Ground Tackle 5/8" Nylon Line With Thimbles	100			
Hand Tools (box)	1			
Hand Tools (box)	2			
Hand Tools (yellow box)	4			
Hard Hat	11			
Heaving Line	15			
Jasons Cradle (Man Overboard Rescue)	2			
JBF 420 Equipment box (electronics)	1			
Life Jackets Type II	8			
Line cutting knife	6			
LINE THROWING GUN	2			
Lines	1			
Long Gaff Hook	1			
Loud Hailer Public Address System	1			
Loud Hailer Public Address System	1			
MAGELLAN MERIDIAN GPS	2			
Main Hydraulic Pump	1			
Oil Storage Bladder	7500			
Oil Storage Bladder (Land)	1500			
Outboard and Skimmer Spare Motor Oil	1			
Pathogen Kit	1			
Pelican swivel hook	1			
Poly Mooring Ball A-2	1			
Poly Mooring Ball A-4	14			
Poly Mooring Ball A-6	1			
Poly Tow Lines 3/4"	50			
Portable 12 Volt Search Light	1			
Power Unit Diesel Engine	1			
Pump/Vacuum System	1			
Radar	1			
Radar RAYTHEON RL9	1			
RAYNAV 550 LORAN	1			
RAYTHEON RADAR R10X	1			
Roll of Duck Tape	2			

Roof Ladder	1			
Rubber Gloves, Boots, Tyvek Suits	28			
Search Light	3			
Self Contained First Responders Kit	4			
Silencer	1			
Skim-Pak, Diesel pump& oil/water sep.	1			
Skimmer & Pump Diesel Power Pack	1			
Skimmer, Drum Type W/ Hydraulic Power Pack & Hoses (Super Skimmer Model 24 Action Petroleum Spill Recovery Inc. (617) 496-5000	1			
Skimmer, JBF 3001	2			
sp	4			
Spot Light (Portable)	1			
Survival Suit	1			
Tool Kit 1	1			
Tool Kit 2	1			
Tow Boat	3			
Tow Line 1" Nylon (Sampson)	200			
Tow Line 5/8" Nylon	450			
Tow Lines 3/4" Poly	1675			
Tow Lines 3/4" Poly (Little Bay Booming Scenario)	400			
Trailer Wheel Chock Blocks	1			
Transfer Pump	1			
Transfer Pump Hydraulic Motor	1			
Transport Trailer	1			
Trip Line Poly (OLD)	1			
Trip Lines	2			
Vacuum Pump	1			
VHF-FM Radio	8			
VHF RADIO	1			
Work Lighting 110v	3			
Work Lighting 220v	2			
Work Suit Mustang	5			
Work Suits Mustang	13			
Work Vest (Life Jacket)	32			
Work Vest Life Jacket	2			

Appendix J

Limitations

LIMITATIONS

This Risk Management Plan (RMP)/Process Safety Management (PSM) Manual has been developed by Triton Environmental, Inc. (Trition) based, in part, upon information provided by GECS. Triton provides no warranty regarding the accuracy and completeness of this information. Some of the principal information provided by GECS includes by is not limited to:

- Process Safety Information
- Hazard Assessment
- Operating Procedures
- Mechanical Integrity
- Contractors
- Emergency Response
- Facility Plot Plan Details and Facility Drawings

In addition, portions of the RMP/PMS Manual were developed by GECS and incorporated, with approval of GECS, directly into the text of these plans. Triton provides no warranty regarding the accuracy and completeness of this information. Some to the principal information provided by GECS and incorporated into this RMP/PSM Manual includes but is not limited to:

- Emergency Response Procedures
- Emergency Phone Contacts
- SCR Description
- Operating Procedure Training Outlines
- Emergency Response Equipment

This plan was prepared for GECS and Newington Energy. No person or other body shall be entitled to rely upon or use information presented in this Report without written consent of GECS, Newington Energy, and Triton Environmental, Inc.

Appendix K

Distribution List

Newington Energy, LLC
Newington, New Hampshire

Distribution List for Integrated Contingency Plan (ICP)/
Emergency Response Action Plan (ERAP)
Risk Management Plan - Process Safety Management (RMP-PSM)

Group	Name	Plans	Paper, CD , Both	Copy #	Revision #
Newington Energy/GECS - Facility Copy	Argyros, David	ICP/ERAP/RMP-PSM	Both	1	3.0
Newington - Fire Dept *	Greenleaf, Chief	ICP/ERAP/RMP-PSM	CD	2	3.0
Newington - Police Dept	Loomis, Chief	ICP/ERAP/RMP-PSM	CD	3	3.0
Seacoast Tactical Emergency Response Team	(Sent with Newington - Fire Dept. Transmittal)	ICP/ERAP/RMP-PSM	CD	4	3.0
US EPA Region I	Jarrell, Alan	ICP/ERAP	Both	5	3.0
NHDES - ARD	Scott, Robert	RMP-PSM	CD	6	3.0
EFSEC Committee	Drew, Timothy	ICP/ERAP/RMP-PSM	CD	7	3.0
ConEd - EH&S	Douglass, Alan	ICP/ERAP/RMP-PSM	CD	8	3.0
ConEd - Asset Mgt Group	Douglass, Alan	ICP/ERAP/RMP-PSM	CD	9	3.0
GECS - EH&S	Chang, Kathy	ICP/ERAP/RMP-PSM	CD	10	3.0
Portsmouth Regional Hospital	Lotis, Nancy and Duffy, William	ICP/ERAP/RMP-PSM	CD	11	3.0
US Coast Guard (USCG)	COTP	ICP/ERAP/RMP-PSM	CD	12	3.0
United Oil Recovery	Carabetta, David	ICP/ERAP	CD	13	3.0
Clean Harbors	Hickman, Hawk	ICP/ERAP	CD	14	3.0
Triton Environmental	Simonetta, Paul	ICP/ERAP/RMP-PSM	Both	15	3.0

* Chief Greenleaf also serves as primary contact for Local Emergency Planning Committee (LEPC)